UNITED STATES COAST SURVEY.

BENJAMIN PEIRCE, Superintendent.

PACIFIC COAST.

COAST PILOT OF ALASKA,

(FIRST PART,)

FROM

SOUTHERN BOUNDARY TO COOK'S INLET.

BY

GEORGE DAVIDSON,
ASSISTANT COAST SURVEY.

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INTRODUCTION TO THE ALASKA COAST PILOT.

The information herein conveyed of the coast, harbors, climate, and productions of Alaska, formed the principal part of the official report of George Davidson, who was in charge of the party of the United States Coast Survey for the geographical reconnoissance of the coast of Alaska, in August, September, October, and November 1867.* While engaged in this special work it was peculiarly desirable to collect information of those parts of the coast which must necessarily remain without direct examination for some years, to ascertain the resources, the climate, and products of the country, then almost unknown to the United States. In the absence of other official and authentic information, it has been deemed proper to retain the articles upon the climate, vegetable productions, fisheries, timber, fur-bearing animals, and population of the coast. These are important to our fishermen, whalemen, fur-traders, miners, and ship-builders. Extended meteorological tables have been added as appendices; the vocabularies of Unalaska, Kadiak, Kenai, and Sitka, by Lisiansky, and of the Chim-shyáns, by Davidson, have also been added.

As fresh material is collected it will be incorporated, corrections made, and many articles not rigidly pertaining to a Coast Pilot, will be pruned or excluded.

The narratives of the old navigators, explorers, and fur-traders, have been in great part examined and collated for special descriptions of bays, harbors, straits, headlands, islands, coast line, currents, fishing banks, &c.

Among the authorities examined have been Müller, Coxe, Cooke, Meares, Portlock, Dixon, La Pérouse, Vancouver, Lisiansky, Kruzenstern, Kotzebue, Wrangell, Beechey, Seemann, George Simpson, Thomas Simpson, Venjaminoff, Tebenkoff, Holmberg, Grewingk, Annals of the Observatory at Sitka, together with many manuscript maps of the Russian-American Company, and verbal communications from the navigators of the company.

Some of the tracks of the old navigators have been plotted on the best maps extant, and great discrepancies, as in La Pérouse, reconciled. Many positions have been determined from their recorded bearings, &c.

In the official report a general description of the coast, and of the great Japan warm current throwing its waters thereon, preceded the remarks upon the climate, &c.; but it has been judged best to keep everything specially relating to the description of the coast in regular sequence. To understand the peculiarities

* The party were accommodated on board the United States revenue steamer Lincoln, Captain J. W. White, under the special direction of Captain W. A. Howard, United States revenue service, and their duties were subordinate to the special revenue and other duties of that vessel.

of the coast, climate, and productions in that high latitude, it is, however, essential to know something of the causes which produce them.

A general description of the interior route from San Francisco to Alaska by the Strait of Fuca, Gulf of Georgia, and consecutive channels, precedes the description of the coast of Alaska. As these channels are mostly in British Columbia, detailed descriptions have not been made, they being without the scope of the present work.

Soundings are given for the mean of the lower low-waters.

Bearings are ~~magnetic.~~ true

Distances are expressed in geographical (nautical) miles.

ALASKA COAST PILOT.

Before entering upon a detailed description of the coast and harbors of Alaska, it appears desirable to state and compare the distance of Sitka from San Francisco by the direct course with that by the interior navigation through Fuca Strait and the channels lying between Vancouver Island and the main, and thence through the archipelagos to the northward; and to give a general description of the channels and harbors through these archipelagos.

From a position ten miles west of the South Farallon a direct course can be laid to Point Woodhouse, the south point of the entrance to Sitka Sound. This course is about north 23½° west, and the distance one thousand two hundred and fifty-five miles. The shortest distance from the harbor of San Francisco to that of Sitka is one thousand two hundred and ninety-six miles. On the above course a vessel will pass five miles outside Point Arena; fifteen miles outside Cape Mendocino; one hundred and eighty-five miles off Cape Flattery; seventy-five miles off Scott I, at the northwest point of Vancouver Island; thirty-eight miles from Cape St. James, the south point of the Queen Charlotte Archipelago; seventeen miles from the northwesternmost point of the same, while the western shores of the group lie nearly parallel with the course; twenty-three miles from Cape Bartolomo, the southwest point of entrance to Bucarelli Sound; eighteen miles from Cape Ommaney, the southwest point of the entrance to Chatham Strait.

In making this direct course in summer, a vessel will have an adverse current the whole distance; how great it is off shore is not well established, possibly twenty miles per day. In winter this current, running against the prevailing southeast winds, tends to create a larger and shorter sea than is occasioned by the same strength of northwest wind in summer.

In making the passage by the interior channels from the same starting point, the vessel will make a course for Cape Mendocino, one hundred and seventy-seven miles; thence to Cape Flattery, five hundred and forty-four miles. Here the interior channels commence, and the mid-channel course through the Strait of Fuca to the entrance of the Canal de Haro gives seventy-three miles; thence through the Canal de Haro, Shannon Channel, and Active Pass, to the Gulf of Georgia, thirty-five miles; along the western shores of the Gulf, within an average distance of five miles from land, to the entrance of Discovery Passage abreast of Cape Mudge, in latitude 49° 59′, one hundred and seven miles; through this passage and Johnstone and Broughton Straits to Fort Rupert, in Beaver Harbor, near the northern extremity of Vancouver Island, one hundred and seven miles; thence along the Vancouver shore and through the Shadwell Passage to Queen Charlotte Sound, thirty miles; across the entrance to this sound to Cape Mosman, or Cal-

vert, in latitude 51° 24′.6 at the southwest point of the entrance to Fitzhugh Sound, thirty-one miles; through this strait to the eastern entrance of Lama Passage, forty miles; through the passage and Seaforth Channel to Milbank Sound, twenty-eight miles; across the sound and through Finlayson Sound to Point Kingcome, seventy-nine miles; thence westward to Grenville Strait, sixteen miles; through the strait forty-seven miles; through Chatham Sound to Dixon Sound, forty-two miles; across Dixon Sound, (the dividing waters between British Columbia and Alaska,) through Clarence Strait to the north point of Coronation Island, two hundred miles; thence outside around Cape Ommaney and Baranoff Island to the position off Point Woodhouse, eighty miles; or a total distance of one thousand six hundred and forty-seven miles. This gives three hundred and ninety-two miles further than the direct course.

Should a vessel not wish to go outside at all, she can leave the Clarence Sound at its northeast bend and pass through Stikine Strait, Wrangell Passage, Frederick Sound, Chatham and Peril Straits, to Sitka. In this case the navigation is more hazardous and the distance from Dixon Sound three hundred and forty-five miles; this would make about one thousand seven hundred and twelve miles from the South Farallon to Sitka.

A large sailing vessel must make the outside passage, and if bound to Sitka during the season of northwest winds, will find that by making a long tack off shore she crosses the main volume of the current running along the coast from the northward, and that the wind hauls so as to admit of her heading well to the north —at least the latter was our experience in July 1854, when about latitude 43° and longitude 137°. The influence of the above current is generally supposed to be felt about three hundred miles off shore.

A large steamer may make the direct course in part, and be much the gainer, especially if she requires coaling before her return, as coal can readily be obtained at the Nanaimo mines* in the Gulf of Georgia. In such a case, the outside passage northward of Queen Charlotte Sound should be taken. A small steamer, actually capable of making this passage and having coal at Sitka, may find it advantageous to run through the smooth waters of the interior channels and avoid the northwest winds and seas of summer, or the heavy southeast gales of winter. The great objection to the interior navigation is the necessity for anchoring each night, and anchorages are not numerous. In summer this is not a very serious loss of time, on account of the long days. With the recent reconnoissance

* Eighty miles distant from Victoria, on the eastern side of Vancouver Island, extensive deposits of coal occur, known as the Nanaimo mines. These mines were opened in the year 1852 by the Hudson Bay Company, but have since passed into the hands of other parties.

The total shipments of coal from them from the year 1852 to the present time probably exceed two hundred thousand tons, and, according to Macfie, amounted at the end of the year 1861 to one hundred and twenty-three thousand nine hundred and thirteen tons; the shipments for the year 1864 were twenty-nine thousand and forty-two tons.

The coal is highly bituminous, well suited for household use and steaming purposes. The beds are known to belong to the cretaceous period, and are much upheaved and faulted, rendering their exploration difficult and expensive.

The coal is furnished on the wharf at Nanaimo at six dollars (gold) per ton.

sheets of the admiralty, it is practicable to run these channels and sounds in good weather without a pilot; but on account of the liability to fogs, it is desirable and safer to trust to a pilot.

In 1867 the Lincoln, with the coast survey party on board, made the interior passages to Fort Simpson, in latitude 54° 34′ at the eastern extremity of Dixon Sound; thence through Dixon Sound to Cape Kygane and along the coast to Sitka Sound. This shortens the passage, but in thick, heavy weather, it is difficult to make the capes about Sitka, and dangerous to approach too close because of the absence of the usual aids to navigation. Moreover, no off-shore soundings have been obtained off that section of coast to enable the navigator to judge of his position.

For the interior passages the admiralty charts are completed to the north end of Vancouver, and in part finished and published in December 1867, as far as Fort Simpson. Admiralty Chart No. 1917 gives the interior channels from Fuca Strait to Cape Calvert in 51° 24′ at the north side of Queen Charlotte Sound, with all the ocean shores, bays, and harbors of Vancouver Island. Besides this there is a series of charts of the passages on a larger scale. Chart No. 1923 exhibits this interior navigation from Cape Caution in Queen Charlotte Sound in latitude 51° 10′ to latitude 52° 26′. Part of this is there published in detail for the first time since Vancouver's explorations, and is very important as exhibiting many of the dangers of Queen Charlotte Sound, Smith's Inlet, and the entrance to Fitzhugh Sound, several harbors of retreat in that vicinity, several anchorages in Fitzhugh Sound; but especially as exhibiting in detail the Lama and Gunboat Passages leading westward and northward from Fitzhugh Sound to Seaforth Channel and Milbank Sound. These passages are barely indicated by Vancouver and very erroneously laid down on Admiralty Chart No. 2430, where a passage is placed in latitude 52° 01′. In seeking for the Lama Passage at night the Lincoln was misled by this error of the chart, especially as an islet lies in a small cove in this latitude, and gives at night the appearance of an opening. There is not space for a steamer to turn in this place, hardly room to swing to a short scope of chain, and the passage inside and around the island is dangerous. This little opening received the appropriate name of "The Trap."

Northward of Milbank Sound, through Finlayson Channel, this chart is only in outline. It includes the southern part of the Queen Charlotte Archipelago with the Houston Stuart Channel through the islands in latitude 52° 06′ to 52° 09′, and a survey of Rose Harbor in this channel, with the position of Stincuttle Channel through the same archipelago indicated in latitude 52° 13′ to 52° 18′. Admiralty Chart No. 1923 A, with corrections to January, 1868, gives the interior navigation by one main line of channels only, from latitude 52° 57′ to the waters between Alaska and British Columbia in latitude 54° 40′. The main channels are in outline only, but several anchorages are indicated; Ogden Channel has been partially developed, leading from the north end of Grenville Channel, in latitude 53° 55′, to the ocean, via Hecate Strait, lying between these islands and Queen Char-

lotte Archipelago. It exhibits on a small scale Metlakátla and Duncan Bays, on the eastern shore of Chatham Sound; and Port Simpson Bay and approaches. It also gives the survey of Cumshewas Bay and harbor, on the east side of Moresby Island; of the Queen Charlotte Archipelago, in latitude 53°, and the eastern part of Skidegate Inlet, between Moresby Island and Graham Island, in latitude 53° 25′.

Admiralty Chart No. 1901, published in February 1868, contains plans of ten harbors and anchorages of the interior navigation, the Ogden channel and adjacent harbors, all lying between Cape Caution and Port Simpson. It exhibits Schooner Retreat at the south entrance to Fitzhugh Sound, Safety Cove, Goldstream Harbor, and Namu Harbor in Fitzhugh Sound, McLaughlin Bay in Lama Passage, Kynumpt Harbor in Seaforth Channel between Lama Passage and Milbank Sound, Carter Bay at the north end of Finlayson Channel, Holmes Bay at the south end of Grenville Channel, (this is the Horne Bay of previous English charts, and by this name only is it known by traders and the Hudson Bay pilots,) Stuart Anchorage in the north part of Grenville Channel, Ogden Channel, and Alpha Bay in the same channel.

Chart No. 571, published in April 1866, contains four harbors in the vicinity of Queen Charlotte Sound, on the north shore, abreast of Fort Rupert in Beaver Harbor; Blunden and Cullen harbors would only be resorted to by our traders for refuge, while Cypress and Tracy harbors are situated among the narrow intricate arms stretching into the mainland, about latitude 50° 50′, and longitude 126° 50′, twelve miles from the north shores of Vancouver Island.

It is not necessary to follow in detail these connected interior channels of British Columbia, forming part of the great canals extending from the head of Puget Sound, in latitude 47° 03′, to the mouth of the Chilkaht, in latitude 59° 15′. All afford splendid navigation for steamers and small sailing craft. Those of British Columbia are comparatively narrow, ranging from half a mile in exceptional places to nearly ten miles in Chatham Sound and to sixteen miles in the Gulf of Georgia. But it must be understood that to the navigator accustomed to plenty of sea-room these channels look narrow, on account of the great height of their rocky and almost perpendicular shores.

The inlets which occur at the head of the Gulf of Georgia, northeast of Vancouver Island, are worthy of special remark. They are from forty to sixty miles in length, from one to two miles only in breadth, and are walled with abrupt mountains from four to eight thousand feet in height, Superb Mountain attaining eight thousand feet at the head of Bute Inlet, and Mount Alfred eight thousand four hundred and fifty at the head of Jervis Inlet.

According to the admiralty charts there are places in these fiords, within one-half mile or less of shore, where no bottom was found at three hundred fathoms.

In *Discovery Passage*, leading from the northwest part of the Gulf of Georgia, the channel is contracted very much; about eleven miles inside of Cape Mudge the shores are precipitous, rocky, and nearly a thousand feet high, and this occur-

ring near the locality where the northern and southern tidal currents meet and form high tides, there is occasioned at certain stages of the tide a heavy overfall and a current running from four to eight knots per hour. It is exceedingly dangerous to try and run through this race in a fog. Fortunately there are anchorages at either approach of this gorge, which is called the *Seymour Narrows*, where a vessel may anchor until a favorable time. In the *Race Passage* on the south side of Helmcken Island we measured the flood current from the northwest, running seven miles per hour for an hour and a half, and no available position on either shore for an anchorage. Here the scenery is grand, for the mountains close on the southern or Vancouver shore rise to an elevation of over four thousand six hundred feet; on the north shore, on Hardwicke Island the mountains rise two thousand six hundred feet above the water. Thence westward the Johnstone Straits increase to two miles in width and the tidal currents run from one to three knots with a mid-channel depth of one hundred and seventy-six fathoms, no bottom, while the high mountain range on the Vancouver shore rises abruptly to five thousand feet. In Broughton Strait the channel is wider and has less depth, but is filled with islands which decrease the available width, so that the currents reach a velocity of five knots per hour. In this vicinity, however, are numerous places for anchorage. Thence westward, through the eastern part of Queen Charlotte Sound,* the current is from one to three knots per hour.

Towards the north end of Vancouver Island the mountains directly on the coast decrease in elevation, but the mountains on the mainland to the north and northeastward attain heights over six thousand feet above the sea and are snow-clad in July and August. In running northward across the entrance of Queen Charlotte Sound to Fitzhugh Sound from the Shadwell or Bute Pass, the outside dangers to the westward, stretching from a position four miles off Cape Mosman † to a position twenty miles south-southwest from the cape, are readily detected and form a dangerous ground that must be avoided. The islets and rocks making off the entrance to Smith's Inlet‡ are also readily recognized and avoided in good weather; but in foggy or thick weather it is perhaps best to run from the Shadwell or Bute Pass for Cape Caution, a rocky point of small elevation covered with dwarfed spruce, &c., and then for a position one or two miles west of Egg Island, which is two hundred and fifty feet high and easily recognized, but has two islets and a sunken rock half a mile south and south-southwest from it. Leaving Egg Island, a course can be laid for Cape Mosman. This cape, forming the southernmost point of Calvert Island, presents a broad face east and west of low rocky shore line, covered with a thick growth of spruce, hemlock, &c., but backed by mountains two thousand to two thousand nine hundred feet high to the north-

*Named by Captain S. Wedgeborough, of the Experiment, in August 1786.

†Named by the United States Coast Survey in July 1867. See view called Cape Calvert, on Admiralty Chart No. 1923, published in December 1867.

‡Named by Captain James Hanna in 1786.

ward on Calvert Island.* A view of this cape is given; the latitude of the islet off the extreme point is 51° 24′.6.

Queen Charlotte Sound is the only break in this line of interior navigation, and it is not only guarded towards the ocean by many patches of low and sunken rocks, but it is exposed to the full sweep of the ocean swell, and so situated as to appear peculiarly liable to fog. Fitzhugh Sound† is forty miles long, with an average width of three miles, and great depth of water. Its general direction is north, and the shores are bold, and on the west side free from rocks. Several passes lead eastward and westward from it, but most of them are unexplored.

There is an anchorage on the eastern shore of Fitzhugh Sound, in *Schooner Retreat*, the south entrance of which is in latitude 51° 27′.6, and in longitude 127° 45′.8. From this entrance the extremity of Cape Mosman bears south 65° west. From the middle of the south entrance of the harbor the highest hill on the island, behind or east of the harbor, bears northeast, so that it is safe to run for the hill on that course until Karslake Point, the south point of the harbor, bears about south-southeast, and then run mid-channel east and northeast through the narrow throat, only two hundred yards wide, but having eight fathoms in the middle. Inside this *Frigate Bay* expands, and anchorage is had in twenty fathoms. It is high water, full and change, at 0*h*. 30*m*. Springs rise fourteen feet; neaps eleven feet.

Safety Cove is on the west side of the sound, seven miles north of Cape Mosman(?). The entrance is in latitude 51° 31′.6, and longitude 127° 55′.0. It is open to the east, a mile deep, six hundred or seven hundred yards in width, with good holding-ground in soft mud, from twenty-two to fifteen fathoms; very high land all around it; high water, full and change, at 1*h*. 0*m*.; springs, fourteen feet; neaps, eleven feet. It is a good position to wait for fair weather for crossing to Queen Charlotte Island, when bound to the southward.

It was discovered by Vancouver in 1792, and named by him under the first impression that this was the Port Safety of Captain Duncan.

Kwakshua.—This bay opens on the western shore of the sound, and is about half a mile wide at the entrance, but has not been surveyed. There is a small rock off its north point. It appears to stretch nearly westward, but how far is not known. This is believed to be the Port Safety of Captain Duncan, who discovered and named it in 1786, when he placed it in latitude 51° 41′, and recommended it as a very proper place for cleaning and refitting vessels. At the entrance he had one hundred fathoms, whereas in Vancouver's Safety Cove there is only thirty. On the Admiralty Chart 1923, a depth of one hundred and eighty-three fathoms, muddy bottom, is given close off the entrance. Duncan gave a sketch of it. We have never seen the sketch or the bay. The latitude of its entrance is 51° 39′, and the sound is here three miles wide.

Goldstream Harbor is on the west side of Fitzhugh Strait, at the northern end

* Named Calvert Island by Captain James Duncan in 1786.
† Named by Captain James Hanna in 1786.

of Calvert Island in latitude 51° 43′.7, longitude 128° 00′. It is very narrow and irregular. In the narrowest part the channel is not over fifty yards wide and very crooked. At the entrance soundings are given in sixteen fathoms about two hundred and fifty yards from either point. There is kelp off the north point (which is on a small island) with twenty-seven fathoms in it. High water, full and change, 1*h.* 0*m.*; springs, fifteen feet; neaps, twelve feet.

Around the north end of this small island is a channel over a mile wide, called by the natives Hakai, leading to the Hecate Strait and the ocean, and through which Duncan passed to the sea in 1786.

Namu Harbor is on the east side of the sound with Kiwash Island, two hundred feet high, standing nearly a mile west and in the middle of the opening.

The south point of this island is in latitude 51° 51′.5, longitude 127° 54′.3. There is a passage on either side. The best anchorage is about half a mile east of it in twenty fathoms; less water may be had by going a little further in, but with the shores two hundred and fifty yards distant on either hand. There is a sunken rock two hundred yards from the easternmost shore, with a small islet about one cable length to the north-half-west; deep water around the rock. Two miles southeast of this harbor is a range of mountains attaining an elevation of three thousand three hundred and eighty feet.

The "trap" in latitude 52° 01′ has been spoken of in giving a general description of these channels.

The *Lama Passage* opens from Fitzhugh Sound towards the westward in latitude 52° 04′, while the continuation of the sound runs north-northeast, as Fisher Channel, through which Vancouver took his ships to latitude 52° 20′; thence to the westward and southwest into Seaforth Channel.

The Lama Passage is quite narrow, being not quite half a mile wide in two or three places, but with deep water. It runs west for six or seven miles, then north for seven or eight, when it meets Seaforth Channel from the west, and Gunboat Passage from the east; at the first turn a strait, unnamed, leads southwest seven or eight miles to Hecate Strait. The mountains on each side of the passage rise from one thousand to one thousand eight hundred feet above the water.

About midway in the northern stretch of the passage, on the western shore, is a small anchorage called *McLaughlin Bay*, with anchorage in ten fathoms about three hundred yards from shore, but over very uneven bottom. A bare hill two hundred feet high lies next the northern part of the bay. The passage abreast of this has less than thirty fathoms across it, and is only half a mile in width. The latitude of the north part of the anchorage is 52° 08′.6, and longitude 128° 10′.3, and bottom sand and mud. In the northern part of the passage we had anchorage in sixteen fathoms, hard bottom, on the south side of a low, treeless islet, occupied by the Bellabella Indians. Close to the westward was a large wooded island occupied by these Indians before they were reduced by the small-pox. The longitude of the astronomical station of the Coast Survey on the islet is 128° 07′ 50″, or 8*h.* 32*m.* 31.3*s.*

From the north part of Lama Passage a very narrow crooked strait, named Gunboat Passage, runs eight miles eastward to the Fisher Channel.

From Lama Passage the *Seaforth Channel* leads in a general westward direction about fourteen miles to Milbank Sound.* It has an average width of nearly two miles, with two islets nearly in mid-channel, two miles from the eastern end; one of these is a grassy islet about fifty feet high, with poles and Indian houses or graves. Many openings appear in the southern low shores, and numerous bays and arms open towards the north. About southwest of the western islet in mid-channel is the opening of Kynumpt Harbor, with a white rock twelve feet above water at its western point of entrance, which is about one-third of a mile wide, with sixteen fathoms in mid-channel and three and four fathoms close to either shore. The harbor stretches south about half a mile, and has good anchorage in mid-channel half the distance inside, with muddy bottom and eight fathoms of water, but the shores only four hundred yards apart. High water, full and change, at 0*h.* 30*m.*; springs, fourteen feet; neaps, eleven feet.

In the Seaforth Channel there is plenty of water on either side of the islet near Kynumpt Harbor, and the mid-channel soundings show throughout no bottom at thirty-nine fathoms. About the middle of it, on the south shore, the Hecate Channel leads south-southwest for twelve miles to the Hecate Strait, while from the north there are two large arms leading twenty miles through a labyrinth of channels.

The mountains on either side of Seaforth Channel are not so high as along the more interior channels; in the earlier part they attain one thousand one hundred feet, while most of the shores are low and all are covered with timber.

In Milbank Sound,† about three miles northwest from the west entrance to Seaforth Channel, are some white rocks fifty feet high, with a sunken rock having two fathoms upon it, about three-fourths of a mile east of them.

The course is inside these rocks, which lie over two miles from the nearest land to the northeast.

After passing the white rocks keep to the northwest, to avoid a sunken rock four miles north of them and lying one mile off the eastern shore.

Milbank Sound is eight miles across; opening southwest directly upon the Hecate Strait, receives the full force of the southerly swell.

The western point is called *Point Day*, off which numerous islets stretch two miles to the southwest.

Northward of Milbank Sound the strait, taking the name of Finlayson Channel, runs nearly north for thirty-two miles to Carter Bay, with an average width of two miles. From the south entrance of the channel a peculiarly marked high pyramidal mountain is seen to the north-northeast. It was called the Quartz Mountain by the Coast Survey, and is named Striped Mountain on the admiralty charts on account of a great white streak down its south side, evidently the rock

* Named by Captain James Duncan in 1786.
† Named by Captain James Duncan in 1786.

denuded of soil and trees. This mountain is wooded nearly to its summit, and the broad white streak, extending almost from the summit to the bottom, is a very distinctive mark.

The land at the base of the mountain is a comparative plateau, sparsely covered with herbage. It is the first untimbered space we saw in going north through these channels.

We estimated its elevation at over two thousand feet, while higher mountains appeared to the south of it. It was a little over a mile from the water, and bounded on the north by a channel leading northeast to another long unnamed strait. The position of this mountain is latitude 52° 27′.2, longitude 128° 24′.5, and should be readily distinguished by any vessel coming round Day Point from Hecate Strait. Abreast of this Striped Mountain and near the western shore the admiralty chart has no bottom at one hundred and seven fathoms. As the chart in this region is only in outline, the following extract from our journal may not be uninteresting. "About ten miles north of this mountain on the western shore is a timbered hill, shaped remarkably like an old-fashioned cocked hat, as seen from the southward. It is over eight hundred feet high, and is in reality a small island, with the mountains west of it rising about three thousand feet high. Nearly abreast of it on the eastern shore is the first cascade we noticed going north. It comes from a crater-like depression in the high mountains. Three miles further north on the western shore is a mountain lake, with a fine cascade breaking over the rim of the crater-like basin and foaming for several hundred feet down the mountain side."

The heights of these mountains we afterward approximately determined from Carter Bay, and found two thousand nine hundred and eighty-four feet and two thousand seven hundred and twenty-four feet; this will give a fair average of the elevation of the shore mountains in this channel.

In latitude 52° 38′, or ten miles north of Striped Mountain, according to Admiralty Chart No. 1923, there is a channel opening to the west with a large island in the entrance; this channel runs north-northwest for about seven miles, (when an opening makes to the southwestward,) then north-northeast eleven miles into the regular channel north of Carter Bay.

This side channel has not been examined, but we are informed that it has been traversed, found good, has an average width of nearly a mile, and avoids the shoal and Hewitt Rock, with ten feet on it at low water, situated in the regular channel at its narrowest part, five miles northward from the southwest point of Carter Bay. Whether the island in the southern entrance to this channel or the "Cone Point" of the admiralty chart is our "Cocked Hat," we have no present means of determining, as we used the very erroneous English Chart No. 2430.

Nine miles northward of Striped Mountain the admiralty chart has soundings of forty-four fathoms, rocky bottom in mid-channel, and five and a half miles further north soundings of fifty fathoms, rocky bottom.

In latitude 52° 48′ Finlayson Channel divides; a narrow continuation runs

north-north-east, and an arm called Ship Passage stretches east-northeast to Mussel Inlet.

Carter Bay.—Facing the south, with a channel to the northwest, and another to the northeast, lies the opening of this bay, with as harp, timbered mountain ridge two thousand one hundred and eighty feet high on the west, and a high mountain two thousand three hundred and ten feet high on the east. This is one of the most convenient anchorages in these channels. The bay proper is about a mile deep by half a mile in width, gradually decreasing to the head, where a flat has formed at the mouth of a small rapid stream, emptying a lake about a mile distant.

The best anchorage is in fifteen fathoms, muddy bottom, about three hundred yards from either shore, and four hundred yards from the flat.

In this position the southwest tangent of the land will bear southwest by west, and the southeast tangent south by east. Three fathoms can be carried to the edge of the flat, and ten fathoms close to the shores on either bank. The stream emptying into this bay comes through a gorge in the mountains, and abounds in speckled trout. They were caught ten inches long without a rod, but simply a line held in the hand, with a hook baited with clams dug from the flat at low water. Tracks and signs of animals were plenty, but traveling is very difficult.

"From the anchorage in Carter Bay, looking down Finlayson Channel southwest by west true, a splendid view presents itself; precipitous mountains overhanging the vessel on either hand, and high mountains in the distance on both sides of the channel. On the west side, about seven miles distant, two huge peaks form part of the rim of a great mountain lake, the patches of snow in their gorges (August 1st) and river sides depriving them of much of the massive grandeur of their granite formation. Towards the channel and the water's edge their flanks for one thousand five hundred feet are covered with timber.

Carter Bay was named by Vancouver after one of his crew who died from eating poisonous mussels, and was buried here in May, 1793.

North of Carter Bay no name has been applied to the narrow channel running for thirty-four miles to Kingcome Point, where the main channel makes a sharp turn to the west.

This channel averages about half a mile in width, with very precipitous shores. Five miles from the south entrance of this narrow strait the passage is contracted and the depth of water shoals to a few fathoms. At this contraction is found Hewitt Rock, nearly in mid-channel, with only ten feet of water over it at low tide. The general direction to avoid this danger is to "keep the north shore aboard." Half a mile northwest of it is the east point of the side or parallel channel, coming into this strait from the locality of the "Cocked Hat." In passing through this reach Vancouver says, (vol. II, p. 291,) "at the entrance of the channel running northward from the southwest point of Carter Bay the width was narrowed to about a fourth of a mile, and, having proceeded about four miles, the Chatham suddenly found only six fathoms of water on a shoal stretching from the starboard, or continental shore, into mid-channel; this we passed on the oppo-

site side in eighteen and twenty fathoms water. Beyond this, which is the narrowest part of the channel, formed by a high, round, projecting part of the southwest shore, appearing like an island, the channel widened to nearly half a league, and an extensive opening, taking a southerly direction, indicated a communication with the ocean." This is the western channel that opens near the "Cocked Hat."

Two miles northward of this opening a bay called Grey's Inlet opens to the eastward, but no soundings are given in it. Six and a half miles northward of Hewitt Rock the channel has a depth of thirty-eight fathoms, rocky bottom. In latitude 53° 1′ the channel has its least width of two-fifths of a mile.

Throughout this narrow strait are numerous markings where the avalanches of snow have swept down the steep mountain sides and carried timber and earth with them, leaving tracks of bare rock.

In some cases the trees have been forced into the channel; in others their dead trunks, in grotesque confusion, are found at the foot of the slide.

About latitude 53° 05′ on the western shore is a cascade formed by a great body of water pouring over a rocky incline from a lake at the base of an immense circle of perpendicular mountains. At the proper season it is a great resort for the natives when fishing for salmon, as the cascade is not too high for the salmon to effect an entrance to the lake. Several other lakes, and three rushing, tumbling overflows, falling three hundred to four hundred feet, are seen in the next twenty miles, all on the same side of the channel.

Through this channel Vancouver says he could find no bottom with one hundred and sixty-five to one hundred and eighty-five fathoms of line, but the indications on the admiralty chart do not confirm these great depths. Off Point Kingcome and to the westward of it there are soundings without bottom in one hundred and eighty-nine and one hundred and seventy-nine fathoms.

In the narrow channel Vancouver says that "in the vicinity of 53° 14′ Mr. Whidbey discovered a deep cove near this locality, a smoke issuing from among the stones on the shore, that at low tide formed a kind of beach. On examination a run of hot water was found passing among the stones, which, at high tide must be at least six feet beneath the surface of the sea. They were not able to discover its source, and, having no thermometer, its degree of heat could not be ascertained. Some of the seamen attempted to wash their hands in it, but found the heat inconvenient. It had a saltish taste, and Mr. Whidbey was of opinion that the rapidity with which it flowed could scarcely permit of its receiving this savor from the sea water."—Vol. II, p. 299.

A deep bay opens abreast of Work Island, in latitude 53° 12′, and stretches two miles northward. Abreast of a large landslide on the east shore, in latitude 53° 14′, the mid-channel depth is sixty-four fathoms, over rocky bottom.

At Point Kingcome one of the three great arms stretches northward forty miles, with anchorage about three miles from the point, on the east shore, at the mouth of Fisherman or Ribachy Creek. From Point Kingcome the main channel

runs westward nine miles, where great channels open to the north and south, but the direct route is through Greenville Channel, whose southern entrance lies north 60° west, eight miles from the north point of Horne Bay.

Horne Bay is one of the few anchorages in this vicinity, and is situated directly under the point, seven or eight miles west of Kingcome; it is contracted, with great depth, except at the head where we anchored in it, in seventeen fathoms, two hundred yards from low-water line. It opens to the northwest. (See sketch in Admiralty Chart No. 1901, where it is called Holmes Bay.)

Grenville Channel.—From the south entrance, in latitude 53° 21′, this remarkably straight and narrow channel runs forty-five miles about north 40° west, with the unbroken shore of Pitt Island on the west, and the eastern shore of the mainland, broken at regular intervals by three inlets. The depth throughout the greater part ranges through sixty-one, fifty, to forty-nine fathoms, over rocky bottom, and seventy fathoms over mud. The narrowest part of the channel is not over six hundred or seven hundred yards wide, and on account of the great height of the shores appears much less.

The following description from our journal will convey an idea of some of the striking points of the scenery. "The overflows of great lakes in the mountains pour down the steep declivities; great swaths through the heavy spruce timber reach from mountain summit to water's edge, marking the course of resistless avalanches; the upper part of these paths well cleared of all timber, the lower reach covered with the dead trunks, frequently pointing in one direction; bright green streaks mark the course of older avalanches, where a new growth of vegetation has sprung up; through rifts and gorges in the mountain shores are seen mountains of granite, reaching an elevation of from four thousand to six thousand feet, some smooth, domed, and gray, with every ravine and crevice filled with snow, (August 2,) and trickling streams therefrom, others covered with patches of dark green to relieve the wildness of the scenery."

Fourteen miles from the southern entrance anchorage is had in *Lowe Inlet* on the east shore; half a mile inside the entrance of this inlet bottom is found at eighteen fathoms. The approach to this inlet from the south is indicated by a bare hill four hundred feet high on the western shore, two miles southeast of the entrance which opens directly to the south. Five miles from the northern extremity anchorage is found on the western shore in *Stewart Harbor.*

Anchorage in ten fathoms on the northwest side of a point or tongue forming the east side of the harbor, and projecting half a mile north from the shore. A rock is laid down half a mile northwest of the extremity of this point, having thirteen feet at low water, and another just inside, bare at low water. (See Admiralty Chart No. 1901.)

The northern end of the Grenville Channel expands to three miles in width, but the middle is occupied by a large group of comparatively low, wooded islands called the Gibson Group. The usual channel is to the west of them, and when abreast of them the wide passage to the sea, known as Ogden Channel, opens to

the southwest. Nearly west from the north end of the Gibson Group is a small, low, wooded point, making out half a mile, with very deep water at its south side, but having anchorage on the north side. In this vicinity the rocks are metamorphic slates, sandstones, and shales, trending northwest and southeast; some small barren quartz veins accompany the slates. In this vicinity we found the water change its color to a dirty white, evidently brought from the river Skip, through Port Essington. Hence northward the waters expand into large arms and sounds. *Chatham Sound*, lying nearly north and south for forty miles, connects the waters we have passed through with those of Dixon Sound and the Straits of the Alexander Archipelago. Sunken rocks are laid down on the charts, but their positions are doubtful. On the east side of the sound, in latitude 54° 20′, lies Tugwell Island, connected with the mainland by a low sand spit nearly two miles long east and west, and forming the bay of *Metlakátla* on the south, protected from the northwest winds and swell; and *Duncan Bay* on the north side, protected from the southeast winds. The Admiralty Plan No. 364, exhibits the details of these bays. The country behind these bays is pleasantly rolling, with patches of open ground. A thriving village, with an Episcopal missionary church is located here.

Port Simpson.—In the easternmost part of Dixon Sound, where it meets the north part of Chatham Sound, and fifteen miles north of Duncan Bay, lies this large bay, open to the west, but protected by a large reef, and by Birnie Island. The north shores of this bay run northwest and southeast for nearly four miles; and the south shore lies east and west, over two miles. On the north side of the southwest point is the usual anchorage, off the station of the Hudson Bay Company, and the large village of the *Chim-shyans*. Two miles west of Fort Simpson lies the north end of the moderately high and wooded island named Finlayson, from which the south end of the moderately high and wooded island, named Birnie, lies north 24° east, one and a half mile. The triangular space between the north end of Finlayson, the south point of Birnie, and Fort Simpson, is mostly occupied by an extensive rocky reef, uncovering at many points at low water. Two passages lead to Port Simpson: one, the southern, lies between the east shore of Finlayson Island and the main, three miles long, north and south, and half a mile wide in narrowest part, with a very narrow passage through the reef; this is that usually pursued by the Hudson Bay Company's vessels coming from and returning south. Another, the northern and the safer passage, is between the south end of Birnie Island and the north point of the reef, lying half a mile south of it. This channel has about twenty fathoms of water. Pass within one-quarter of a mile of the south rocky point of Birnie Island, steering east-southeast one mile, or until the easternmost Indian houses bear south-southeast, and run for them until the stockade bears south three-quarters west, about six hundred or seven hundred yards distant, when anchorage will be found in ten or eleven fathoms. These courses will keep the eastern edge of the reef distant over a quarter of a mile.

The rise and fall of tides permit large vessels being laid out here for repairs,

head on the beach, on the west side of the rocks upon which the landing jetty is built.

High water at full and change 12*h*. 35*m*.; spring tides twenty-one and a half feet; neaps fourteen and a half feet.

Admiralty Plan No. 2426, published 1856, exhibits the details of this port anchorage and approaches. In this chart the geographical position of the stockade is latitude 54° 33′ 35″ north, longitude 130° 25′ 30″ west. In Admiralty Chart No. 2431, published in 1865, the latitude is 58° 38′ north, and longitude 130° 26′.2 west; in No. 1923 A, published in 1868, the latitude is 54° 33′.4 north, and longitude 130° 26′.1 west. Chart No. 2431 is evidently founded upon Tebenkoff's.

Vessels approaching Port Simpson by the northern passage will avoid a large reef called the Pointers, lying three miles north, seventy west from the south end of Birnie Island.

Fort Simpson is a stockaded post of the Hudson Bay Company, and the most important in this section of the country. It consists of a square, timbered palisade, with a front of two hundred feet, and depth of one hundred and sixty feet, having wooden bastions at the northwest and southwest angles.

It is entered by a large gate opposite the beach, and has one or two smaller doors at the rear, leading to the vegetable gardens. Within this stockade are large timber buildings for the traders and their families, for storehouses, messhouse, and the great building on the west side for the reception of the furs until ready for shipment. The roofs of the houses showed many marks of rifle balls of belligerent parties of Indians, when firing at each other, and also when firing upon the post.

The United States Coast Survey station was between the outer fence and the stockade, on the west side of the great gate. No observations could be obtained for latitude, which is assumed approximately at 54° 33′ 35″; the longitude was determined at 130° 22′ 49″, or 8*h*. 41*m*. 31.3*s*. west.

The habitations of the Indians number about one hundred, and are generally large wooden buildings, from thirty to forty feet wide, sixty feet long, and fifteen to twenty feet high.

Before most of the houses there is a tall thick post, carved with grotesque figures. These are illustrated in the accompanying views.

When all the tribes and branches are assembled they number nearly two thousand souls. Very few are hunters, but all are inter-traders. They frequently endeavor to prevent the Hydahs, of Prince of Wales Island, Alaska, from trading directly with the Hudson Bay Company, but the Hydahs generally come in large numbers, armed, and without their women. The Indians of this section are all good carvers of silver, and very ingenious. Some read, write, and speak English.

The country in the immediate vicinity of Fort Simpson is not high, and for half a mile back has been cleared of wood for fuel and building. But the soil is covered with a foot or two of moss, sphagnum, thoroughly saturated with rain-water, and almost impassable to the traveler. We were unable to find firm

ground for the transit block except in the well-drained soil inside the grounds of the company.

The season of 1867 was one of remarkable prosperity to the Hudson Bay Company at this post, and the stock of furs the finest and heaviest purchased for many years.

Berries were not ripe August 1 in the company's garden, but some were found ripe in the forest; potatoes were in bloom; cabbages never head; lettuce was very fine and crisp. Root crops mature; cereals do not.

The geology of this vicinity is different from that of the narrow channels and straits to the southward.

The islands in the immediate neighborhood to the southwest are comparatively low, though to the north and northwest high snow-capped mountains are to be seen. The rocks in the vicinity of the fort are regularly stratified mica schists, generally garnetiferous, and sometimes pyritiferous; these pass into gneiss and granite. Their trend, as examined along the shore near the fort, is nearly northwest and southeast, (magnetic,) and their dip is thirty degrees to the northeast.

The schists are seamed with numerous intercalated quartz veins, in some instances highly charged with iron pyrites. According to the factor of the Hudson Bay Company at this post, gold is to be found by panning almost anywhere in the vicinity; repeated trials which were made at different points, particularly in the bed of a small stream two miles northeast from the fort, failed to establish the correctness of his assertion.

ALASKA.

COAST CLIMATE OF ALASKA.

The experience and observations of a few months upon this coast can do little towards determining the average conditions of the climate, but the valuable published records of the observatory at Sitka, from 1849 to 1862 inclusive, have been examined, reduced, condensed, and tabulated in the appendix; while the small table herewith exhibited contains the results of the observations published to 1864.

For the climate of the Aleutian chain the observations at Iliouliouk on Unalaska Island, by Bishop Veniaminoff, from 1825 to 1834, have been reduced, re-arranged, and condensed in the Appendix No. 3. In addition thereto is a table *in extenso* of the observations of Priest Shayesnikoff at Iliouliouk, during the winter of 1866–'67, being part of a regular series maintained by him.

The existence of a branch of the warm Japanese stream carrying to this coast its waters imposes, at the outset, the necessity of a high isothermal line along the whole northwest coast of America. The records of the state of the

thermometer establish the fact; the botany and even the conchology of the whole region add their certain confirmation.

The whole southeast coast of the Alaska peninsula is bathed by these same waters, which retain a high temperature to Kadiak; thence westward this temperature decreases, although the latitude decreases.

The report of the botanist exhibits a flora that could not exist in this latitude without an unusually high isothermal condition, accompanied with a great condensation of vapor and precipitation of rain.

Our collection of shells has not yet been studied sufficiently to afford data on this point, but we have the authority of Woodward's Manual of the Mollusca for saying that among the Aleutian Islands "the influence of the Asiatic current is shown in the presence of two species of *Haliotis*, while affinity with the fauna* of West America is strongly indicated by the occurrence of *Patella*, (*mitra*,) three species of *Crepidula*, two of *Fissurella*, and species of *Placiphomia*, *Saxidomus*, and *Petricola*, which are more abundant and range further north than their allies in the Atlantic."

On our passage inside of Vancouver Island, from Victoria to Port Simpson, in 54° 34′, the temperature of the surface water, in the latter part of July and early part of August, was 52°.1; that of the air, 54°.9. Outside the Alexander Archipelago, from Port Simpson to Sitka, in 57° 03′, the temperature of the surface water was 52°.1; air, 54°.9. In Sitka Harbor, where the cold waters of the mountains affect the waters of the sound, our observations, from August 13 to the 22d, gave 50°.5 for the surface water, and 53°.4 for the air. On the voyage from Sitka to Kadiak, August 22 to the 26th, the surface water was 49°.4, and the temperature of the air 53°.5; the temperature of the water decreasing irregularly from 50°.6 to 47°.1, but variable. In the harbor of St. Paul, from August 26 to the 31st, the surface water was 45°.8, air 49°.5. On the voyage from Kadiak to Unalaska, August 31 to September 6, the surface water was 45°.9, and very uniform, the lowest being 45°.1; the temperature of the air was 48.9. In Ulakhta Harbor, in Unalaska Bay, from September 6 to the 12th, the surface water was 45°.4, and air 51°.0; the temperature of the water reaching as low as 42°.9. From Unalaska to Sitka, September 13 to the 20th, the surface water was 49°.4, rising from 46° to 50° as we advanced westward. In Sitka Harbor, from September 21 to the 26th, the surface water was 49°.4, and the air 51°.6. At the mouth of the Chilkaht River, at the head of Chatham Strait, in latitude 59° 12′, and sixty miles east of Mount Fairweather, October 17 and 18, the temperature of the water was 39°, and the air 42°.2. At Sitka, on the 27th of October, when the mountains were covered with snow, and snow and hail had fallen on the water, its temperature was 41°, and that of the air 44°. In all

* The conchological fauna of West America from Port Simpson to Attou Island, and including the shores of Bristol Bay and the Pribylof Islands, is undivided. North of that bounded along shore by the line of floating ice, and at the bottom of the sea by temperature of the water, extends the truly circumboreal fauna common to Behring Strait, Greenland, the Ochotak Sea, and the extreme north of Europe. W. H. DALL.

these cases it is remarked that the temperature of the air was nearly 3° higher than that of the water. Lisiansky, on his voyage from Kadiak to Sitka, August 16–20, 1804, with fresh westerly winds, found the temperature of the air 59°, and barometer 29.5 inches, but he records no observations for the temperature of the water. June 15–22, 1805, on his voyage from Sitka to Kadiak, with moderate easterly winds, the temperature of the air was 53°, barometer 29.5 inches; November 11 to 15, 1804, on the voyage from Sitka to Kadiak, with fresh easterly gales, the temperature of the air was 46°, barometer 29.2. The observations of Lisiansky have a certain value, but the temperature of the water would have added greatly to their importance. We see in those regularly recorded by the United States Coast Survey party, three times a day, that a great body of warm water exists off the coast; for we hardly reach sixty miles inside the Alexander Archipelago before the temperature decreases from 46°.5 to 39°.

Data concerning the climate of the interior of Alaska are wanting; observations have been few and isolated. From gold miners who have been nearly ten years on the Stikine River, debouching into the Alexander Archipelago in latitude 56°, we learn that east of the coast range of mountains the summers are dry and comparatively warm, the winters very severe, with heavy falls of snow that completely stop mining operations. The country is sparsely covered with a growth of small trees. The engineer engaged in exploring the inland route for the Russian American telegraph line, reports that in latitude 55° and longitude 126°, 2° south of Sitka, and one hundred and sixty miles east of Queen Charlotte Sound, "ground ice" can be found at any time of the year at a depth of from six to eight feet below the surface, and in that region the surface usually freezes to the depth of two feet in the winter, leaving an intervening stratum of unfrozen soil from four to six feet thick. This ground ice does not prevent the growth of plants, a fact confirmed by Seeman in his "Botany of H. M. S. Herald, 1845–51," in western Esquimaux land. In that region he found vegetation flourish where the ground ice was but two feet from the surface.

CLIMATE OF SITKA.

Appendix No. III gives much valuable meteorological information condensed from the full and detailed observations made at the Sitka Magnetic and Meteorological Observatory, on Japonski Island, sustained by the liberality of the Russian American Company since 1847. The latter published records have not been received from St. Petersburg, but we have been able to obtain those up to 1862 inclusive. By this abstract it will be seen that the mean temperature of the year at Sitka, in latitude 57° 03′, derived from twelve years' observations, is 42°.9 Fahrenheit.

Beginning with the month of March, we can judge of the temperature of the different seasons by the following scheme:

Months.	Fahrenheit.	Seasons.
	°	
March	35.5	Spring.
April	41.2	41°.3
May	47.2	
June	51.7	Summer.
July	55.3	54°.3
August	55.8	
September	51.2	Autumn.
October	44.2	44°.2
November	37.8	
December	31.7	Winter.
January	31.1	31°.9
February	32.9	

In the general table will be found one month of unusual cold and extraordinary clearness of weather. In November 1853, the mean temperature of the month was only 19°.85, but 0.451 inch of snow fell upon parts of six days, and the month was marked by strong northeast winds. The highest mean for any month in twelve years is 58°.3 for July 1860, during which month nine days are recorded upon which rain fell, but no record appears of the amount.

The mean of all the minima taken from the daily observations for nine years of the above period is 38°.6, and of the maximum for seven years 48°.9, showing a remarkably equable climate, whilst its humidity is demonstrated by the small differences of the wet and dry bulb thermometers.

The same appendix exhibits the monthly and yearly amounts of rain, melted snow and hail that have fallen for fourteen years, and also the number of days in each month upon which rain, snow, or hail fell, or thick fogs prevailed.

The average annual amount of rain, melted snow and hail that fell from 1847 to 1864, (with the exception of the year 1855,) was 82.66 inches, or within a fraction of seven feet, (yet five inches less than the fall at the mouth of the Columbia River,) and the average annual number of days upon which rain, snow, or hail fell, or heavy fogs prevailed, was two hundred and forty-five, or two days out of every three, while it does not follow that the other days have a clear sky.

The following scheme exhibits the rain-fall for the different months in sixteen and a half years:

Months.	Inches.	Seasons.	Rainy days in 14.1 years.	
		Inches.		
March	4.97	Spring.	19	Spring.
April	5.20	14.26	18	55
May	4.09		18	
June	3.71	Summer.	22	Summer.
July	4.39	14.89	21	66
August	6.79		23	
September	9.97	Autumn.	23	Autumn.
October	11.91	30.88	26	72
November	9.00		23	
December	7.89	Winter.	19	Winter.
January	7.63	22.63	20	57
February	7.11		18	

The greatest amount of rain that fell during any one year, according to the tabulated appendix, was 95.8 inches, or eight feet, in 1850; the smallest was 58.6 inches in 1861. The most that fell in any one month was 19.5 inches, in October, 1853; the least was 0.5 inch, in November 1853. But the Appendix shows that a rainfall of 21.3 inches took place in August 1867; 16.0 inches in September, and about fifteen inches in October, or quite fifty-two inches of rain during the period of our expedition to Alaska.

The Appendix gives in detail the daily means for the months of May, June, July, August, and September, 1867, indicating, in part, the weather we have unfortunately encountered, and the amount of clear sky, from means of nineteen hourly observations each day.

Lütke has given interesting tables, compiled from two years' observations, in 1828 and 1829, wherein we find there were, on an average, each year, one hundred and seventy days calm, one hundred and thirty-two days with moderate winds, and sixty-three days with strong winds. Also, an average of seventy-four fine days, one hundred and seventy-four days on which rain or snow had fallen at intervals, and one hundred and seventeen days on which rain or snow had fallen continually.

Kotzebue says that "in the middle of winter the cold is not excessive and never lasts long." "Throughout the winter of 1824–'5 the weather had been particularly mild; the snow in many of the valleys had never lain above a few hours at a time." "From March to the middle of August 1825, there was an almost uninterrupted continuance of fine weather."

The enormous amount of rainfall along a seaboard essentially cloudy throughout the year, has its normal effect upon the class of vegetation that will succeed

in ripening under such conditions of climate. The whole extent of country subject to these rains is covered with sphagnum from one to two feet in depth; even on the steepest hillsides this carpet is saturated with water, and renders progress through it very slow and difficult, especially when there is a heavy growth of wood and underbrush. At Fort Simpson, the Stikine, Chilkaht, Kadiak, Unalaska, and the islands westward, this morass exists to the summits or snow line of the mountains. In no part of the country, except on two or three mountain sides on Chatham Strait, between the eastern entrance of Peril Strait and the mouth of the Chilkaht, have we seen herbage or trees destroyed by fire, as is so universally resorted to in Washington and Oregon, both by the natives and by the settlers. At our different stations we attempted to obtain the temperature of the earth three feet below the surface, but never penetrated a foot before the hole began to fill with water.

The prevailing *winds* in winter are easterly, and if from the southward are accompanied with rain and snow; when from the northeast the weather is generally clear and cold. La Pérouse says that when the wind is but a few degrees north of west the sky is generally pretty clear. When approaching the coast in the region of Behring Bay, he says: "I first thought these seas more foggy than those which separate Europe and America; but I should have been greatly mistaken to have irrevocably embraced this opinion. The fogs of Nova Scotia, Newfoundland, and Hudson Bay have an incontestable claim to pre-eminence from their constant density." The stormy weather commences in October; storms and tempests are frequent in November and December, and from the vicinity of Sitka the aurora borealis is seen frequently and very brilliant during clear cold nights. The winter weather breaks up about the end of March, and the Russian-American Company's vessels are ready for their first fur trading early in April, when the weather is cold but comparatively dry. March, April, May, June, and July, and sometimes August, are good months, with an average monthly rainfall not much greater than that on the Atlantic coast.

The general opinion of the old navigators and fur traders, who visited and sometimes wintered on this coast, was, that after the middle of September it was next to impossible to continue their examinations or trading trips, and they either sought more southern latitudes or wintered in some well-sheltered harbor. The latter was generally avoided, on account of the losses sustained in their crews by the ravages of scurvy. It is to be noted, however, that *these trading vessels for discovery alone* rated only from one hundred to three hundred and twenty tons burden.

The weather in Cook's Inlet, north of 60° of latitude, is said to be much better in summer than along the coast generally. When fogs and rain are prevailing along the seaboard and at the entrance to the inlet, clear skies and pleasant weather exist twenty miles within the inlet, unless very heavy southeasters be blowing. Dixon reports that from July 19 to August 30, 1786, he observed the

mean state of the thermometer to be 58½°. Unless exceptional, this is warmer than Sitka. Most of the old navigators speak of the pleasant aspect of its shores and its summer climate. The company's navigators all combine to commend it. Unfortunately we have not any available records of meteorological observations at the Russian trading establishment of St. Nicholas, on the east side of the inlet, at the mouth of the river Kaknu, in latitude 60° 32′. Tebenkoff says the climate of Cook's Inlet is more extreme than the rest of the colonies. The thermometer in summer frequently rises to 95°, (28° Réaumur,) and in winter falls as low as 58° below zero, (—40° Réaumur,) when the inlet freezes as far south as Katchetmakski* Bay. In the spring the great tides break up the ice, which very often lifts rocks of considerable size and scatters them over the bay and its shores.

We have no regular record of the temperature at Prince William Sound, one hundred miles east of Cook's Inlet. The following extracts from Meares's introduction to his narrative must be taken with the knowledge that he wintered here under very unfavorable circumstances, in a small bay, close under the north flank of high mountains that did not allow the rays of the sun to reach him. He had at noon, in midwinter, but a faint and glimmering light, the meridian sun not being higher than 6°—he was in latitude 60° 30′—and that obscured from them by hills reaching 22° high to the southward; snow covered the earth to a great depth. He ran short of good provisions, and lost most of his crew by scurvy.

On the last day of October, 1786, the thermometer fell to 32°, with the mornings and evenings sharp.

In November, the thermometer ranged from 26° to 28°, and ice formed from the vessel to the shore.

In December, the temperature fell to 20°, where it continued most of the month.

In January and February 1787, the temperature continued for the greater part of that time at 15°, although it sometimes fell to 14°. In the first half of January were heavy falls of snow.

March was cold as January and February, with much snow; the temperature continued for the most part at 15° to 16°, although it sometimes rose to 17°.

The first part of April was frosty, accompanied with violent southerly winds.

At the end of the month the thermometer in the sun rose to 32°; at night it fell to 27°.

To the middle of May the thermometer in the shade stood at 40°, and at night fell to 32°, with thin ice, and the main body of ice with which his vessel was surrounded began to loosen from shore.

Reflecting upon the high latitude of this sound, its waters embraced by high mountains on three sides, chilling it with the eternal snows and glaciers of the Mount St. Elias range, we may be surprised at the comparatively high temperature of the winter, especially in the location he selected, out of the reach of all sun influence for a couple of months. At this high latitude the lowest record

4 *Or Chugachick

he gives is 14° Fahrenheit, but the uniformity is remarkable, and especially as continuing below 32° for six months.

Tebenkoff (1848) gives a dark picture of the appearance and climate of Prince William Sound, calling it desolate, gloomy, and deserted; surrounded by rocks and pine forests; mountains covered with eternal snow, and enveloped in perpetual fog, or invisible with drizzling rain. Rain falls sometimes for a whole month, and there are not more than sixty or ninety sunny days in the year. During the months of July and August, the thermometer showed 59° on fair days and 46° on rainy days. The frost in winter is very severe, but of short duration, for the south winds change it suddenly to thaw and rain.

CLIMATE OF KADIAK.

We were unable to obtain any meteorological record at St. Paul, and our knowledge of it is extremely limited. In general terms we know that it is warmer in summer than at Sitka, and colder in winter; and this is corroborated by the fact that ice obtained at Sitka for the San Francisco market has been found unfit for commerce on account of being full of air-holes, &c., by which it rapidly melted, and recourse was had to the ice formed by the colder winters of Kadiak. The yearly supply to San Francisco for the whole interior and seaboard consumption is about three thousand two hundred tons, of which nearly one-half is lost by melting; and it is a curious fact that the demand is no greater now than it was fourteen years ago.

The following information concerning the ice crop was obtained from the company at San Francisco and St. Paul: The ice lake is about five hundred yards from the shore and nearly surrounded by wood, so that the spray from the ocean beach does not reach it. It is partly artificial, having been increased in area and depth by the formation of a dam sixteen feet high, which gives the lake an extent of two thousand two hundred feet by seven hundred, and a depth of twenty-two feet. The surplus water drives an overshot wheel giving motion to a saw-mill. The ice crop comes to maturity by December; the cutting commencing when there is twelve inches thick of clear, solid ice, and ending in February, when it has generally increased to eighteen inches. The cold is uniform, and the ice has not been known to make more than one and a half inch per night, although the thermometer has been once recorded as low as 18° below zero during the last five or six years. During these unusual cold epochs the air is quite calm and labor practicable. The average fall of snow is three feet and lasts until June, when it disappears very quickly, and grass springs forward with remarkable rapidity.

In the latter part of August we found grass growing from the sphagnum and having an average height of not less than two feet, while in many places it was fully three feet. It is usually cut about the first of August, and cures well and rapidly with a few warm days. Some stacks we examined were in as fine condition and as sweet as any we have seen on the Atlantic slope. Western men with us corroborate our botanist in saying that this is really a fine grazing country, and

capable of sustaining a very large number of cattle. The condition of the cattle we saw about St. Paul, and on Spruce Island, and at the freedmen's settlement, was fine, and the flavor of the beef we obtained was good.

Tebenkoff says that the Russian-American Company had a rancho in one of the bays on the south shore of Chiniak Bay, where two hundred head of cattle grazed; and also at another station they had a number of cattle grazing.

Lisiansky mentions barley having been sown in 1804, and that it succeeded in many places; but "the dark and rainy weather is unfavorable to agriculture, which requires great labor and patience—traits not belonging to the natives." Cabbages, carrots, turnips, and potatoes are successfully raised, and the natives have many well-fenced gardens on the low ground abreast of Chagavka Cove. Potatoes were in bloom when we left, August 31.

"The clearness of the weather depends entirely upon the direction of the winds. Fine weather accompanies winds from the south, round by the west, to north; with easting in them, fogs and rain prevail. During the month of December, though the winds blew from the north, the weather was tolerably mild. The thermometer was not lower than 38° till the 24th, when it sunk to 26°. The ground was then covered with snow and remained so several months. The winter, however, was not supposed to set in till the beginning of January. During its continuance, a few days of February excepted, the air was dry and clear, with fresh winds from the points between west and southwest. The severest frost was on the 22d of January, when the thermometer fell to zero. The last days of February and the beginning of March were also so cold that the mercury stood between 13° and 14°. During this period I purposely measured the thickness of ice in the ponds near the settlement, and found it to be eighteen inches. On the 9th of March commenced the return of spring. (Lisiansky, page 171.) The winter we passed here was an exceptionally dry one." (Page 190.)

The navigators of the Russian-American Company assure us that the most violent winds are those coming in great gusts from the mountains behind the town, sometimes even unroofing the houses and driving the vessels from their moorings. The old archives of the company doubtless contain much valuable information about the climate and productions of this place, as St. Paul was originally their principal establishment, and only yielded to Sitka on account of the warlike character of the Koloshians, and the greater abundance of sea otter about the Alexander Archipelago.

During our stay at Kadiak, from August 26th to the 31st, the mean temperature of the air was 49°.5 and of the water 45°.8.

CLIMATE OF THE ALEUTIAN ISLANDS.

Our stay at Unalaska was too limited to enable us to judge of the climate except in the influence it has upon the botany of the islands.

There are no trees of any size whatever upon any of the Aleutian Islands. A few Sitka spruce brought to Unalaska Bay, and planted upon an island in

the western roadstead, or Captain's Harbor, some thirty years since, are said not to have grown as many inches in that time; but it appears to me quite probable that if trees were placed in good situations at first, and properly attended to, they would succeed. This single and unsuccessful attempt well exemplifies the retarding effect which the single and sole aim of fur trading has had upon the development of the colony. Bishop Veniaminoff says that great numbers of dead willows are found among the mountains of Unalaska.

Not a stick of timber can be procured nearer than Kadiak, and every bit of drift-wood is eagerly seized upon for fuel, for which the inhabitants are dependent upon the heavy growth of sphagnum covering mountain and valley, and on the blubber of the seals and sea-lions. Grasses grow luxuriantly, and when cut and cured are used to feed the small Siberian breed of cattle through the winter.

The barometer observations of the United States Coast Survey party made during the ascent of the active volcano of Makushin, September 7 to 11, place the line of perpetual snow on that mountain at three thousand one hundred and ten feet, while the lowest limit of the small glacier was one thousand feet lower; and vegetation ceased at two thousand four hundred and fifty feet above the sea, except the low form of vegetation known as "red snow."

On the 13th of September, when we passed through the Unalga Strait to the Pacific, the whole outline of mountain summits to the east and west was sharply and clearly defined against a beautifully clear sky, and snow had not yet appeared upon them.

But the published meteorological observations of the Greek Bishop Veniaminoff, made at Ilioulíouk, between the years 1825 and 1834, afford much useful material from which to draw fair conclusions of the climate. We have rearranged his abstracts and placed the results in the Appendix, but present some of the generalizations in this place. The dates are reckoned according to "old style." The mean temperature of the year, from nine years' observations, is 38°.03, or 4°.9 below that of Sitka.

Months.	Fahrenheit.	Season.
March	29°.9	Spring. 34°.9
April	33°.4	
May	41°.3	
June	46°.2	Summer. 49°.6
July	50°.6	
August	51°.9	
September	43°.7	Autumn. 37°.6
October	36°.7	
November	32°.4	
December	29°.0	Winter. 30°.1
January	29°.6	
February	31°.6	

The mean range during the day, from the morning to the afternoon observation, is only 5°.0. The highest temperature recorded is 77° upon two occasions, and the lowest 0°.6 below zero; but only upon nine occasions is it recorded less than ten degrees above zero.

Eschscholtz found the temperature of the earth in the sources of the low valleys 38° and 39° Fahrenheit in the beginning of July 1817.

The mean height of the barometer for nine years is 29.74 inches; the highest reading during that period being 30.71 inches, and lowest 28.37 inches. The barometer reaches its highest monthly mean, 29.91 inches, in July, when winds from the southeast to southwest prevail; and its lowest, 29.60 inches, in November, when westerly winds prevail. The fluctuations of the barometer are very great throughout the year, averaging 1.78 inches in each month; the greatest range being 2.31 in December, and the least 1.07 in July.

The clearest months, without clouds, are December, January, and February, when the north and northwest winds prevail.

August, September, and October are the months in which the most rain falls, during which time winds from the south to west prevail. The rainfall is not recorded, but he says that rain falls during some parts of the twenty-four hours upon one hundred and fifty days of each year, and estimates the total fall at only twenty-seven inches, which must be much underestimated.

Snow falls some time in every month except June, July, and August, and is recorded in every month except July.

Thunder-storms are very rare, only seventeen being recorded in seven years, and none in winter.

The clearest month is January, and at any season clear weather accompanies or follows north winds. Very strong winds prevail from October to March.

At Unalaska the aurora borealis is rarely seen, it being recorded but once during the above period of observation, when it appeared like the dawn of day on the 16th of February 1831, (old style.) On the horizon it was dark, but higher up the sky was lighter.

Earthquakes are comparatively frequent, no less than thirty-two being recorded in seven years.

VEGETABLE PRODUCTIONS.

At Sitka fruit trees were introduced in the governor's garden, and special attention devoted to their culture, but they have not borne fruit, except a few small specimens that never matured. Berries abound throughout the country in great abundance and of large size, but generally lack flavor, on account of the absence of direct sunlight. Most of the berries were ripe when we left for Kadiak, August 22, and potatoes were in full bloom. The potatoes yield well, but are of small size and watery. Turnips, beets, carrots, parsnips, and other root crops, with cabbages and the like, are cultivated in a few gardens. Lisiansky found wild peas growing on the shore south of Mount Edgecumbe. Cranberries grow wild, are

quite small and well-flavored, but not in abundance about Sitka; they might be easily cultivated here, and would form a valuable addition to the California market, which now receives its supplies from the northern coast. Berries of all kinds grow wild and in abundance. None of the cereals are cultivated, and it is very doubtful if they would succeed. In fact, except a few very small gardens belonging to private individuals, nothing is cultivated, the population trusting mainly for their food to the annual supplies brought from St. Petersburg and San Francisco by the company's vessels. There is no space cleared about Sitka for the raising of grass, and there are few horses and cattle demanding it; but there appears no difficulty in raising as large crops of grass as at Kadiak, if the land were cleared of wood and the increase of cattle demanded it.

On the southern boundary, at Fort Simpson, we found as fine herdsgrass as any country can boast. It had escaped and was growing wild in thick-lodged masses, without care or culture; and at Sitka the common white clover and the Medick or burr clover, recently introduced by California trade. They seem to flourish and bloom well; hence the use of these and similar grasses as green fodder appears quite practicable; and probably there is quite sufficient fair weather for curing hay.

The prevailing forest tree is the Sitka spruce, growing to great size, covering every foot of ground, and climbing the steepest mountain sides to the height of two thousand or two thousand five hundred feet above the sea. We measured felled trees of this spruce that were one hundred and eighty feet long and four feet thick at the butt, while adjacent standing trees measured over six feet in diameter, and were branchless for over fifty feet. Hemlock, alders, and willows are found, but the most valuable wood of the country is the yellow cedar, with a fine, even texture, fragrant smell, good size, and greater strength than the spruce. We first called public attention to the Port Orford white cedar, in 1851, and, while admitting its many good qualities, have no hesitation in saying that the yellow cedar of Alaska is a much superior wood. It is readily worked, takes a smooth surface, and is remarkably durable. It will make a valuable addition to the cabinet woods of the California market, is superior as a ship timber to any on the coast, and, from our short examination, we are satisfied that it may be obtained of ample size for frames and knees of ordinary-sized vessels. At Skalitch anchorage one was measured eighteen feet in circumference, and estimated over one hundred and twenty-five feet in height. We obtained and forwarded part of the keelson and frame of one of the Russian-American Company's small vessels, which was constructed of this wood over thirty-two years ago, and had been lying a wreck upon the beach for several years. It exhibits not the least sign of decay or teredo attacks; the wood around the copper and iron bolts is nearly as well preserved as on the day they were driven.

The hulls of all the trading and fishing vessels on this new coast may be constructed of this durable wood upon any of the innumerable bays of the Alexander Archipelago. We have seasoned a small piece of this wood for one year in a dry,

warm room, and it has a weight indicating twenty-six pounds to the cubic foot. Under ordinary seasoning the weight would be over thirty pounds.

The original constructors of Fort Simpson laid the ground timbers of pine, thinking it the best. A piece of this cedar having been accidentally used, on recently replacing the rotten timbers, it was found to be the only sound log left after twenty-one years' trial. About Fort Simpson it is scarce, although we saw a sleeper thirty feet long, twenty-eight inches at the butt, eighteen at the extremity, and eight inches thick, besides unwrought knees, &c., used for boat-building. The bark can be stripped off in great sheets, and is used by the Indians for mats, covers to their cayoes, and to make and cover temporary habitations. In this way great quantities are destroyed.

While the vast forests of wood exist upon the waters of Puget Sound, Admiralty Inlet, and the Strait of Fuca, it may be commercially unprofitable to cut and ship even this yellow cedar to the California market, unless native labor can be obtained at low rates to get it out; yet, even if unavailable at the present time, it affords an inexhaustible resource in future, and will prove of the greatest importance as the supplies decrease to the southward.

This timber is found from the southern boundary of Alaska to the farthest point northward we examined in Chatham Strait.

The spruce, yellow cedar, hemlock, &c., cover the coast as far north as Sterya Bay, whence westward to Prince William Sound very little is known, all navigators reporting a very forbidding low coast, covered in part with wood, but closely backed by the great St. Elias range, with its summits averaging from eight thousand to nine thousand feet, and every gorge filled with snow or glaciers. The Russian Company has no factory along this stretch of coast, and their explorers report numerous small streams running through it to the ocean.

On Prince William Sound, notwithstanding the severity of the winters, vegetation is reported to spring up with great rapidity, and berries of every variety and in great abundance flourish where the low shores are not densely covered with spruce, alder, and birch.

The same remarks apply to Cook's Inlet, with its warmer summer and more vigorous vegetation. Its shores are covered with timber.

Similar products continue to Alaska Peninsula and the northern part of the island of Kadiak, although on this island we found the trees smaller and shorter, and growing only in the valleys or low grounds, and in comparatively small areas along the northern and eastern coast lines. We saw none covering the mountain sides. The only tree worthy the name of timber is the Sitka spruce.

This tree resembles in form and foliage our silver firs. The largest we saw were three feet in diameter, and ninety to one hundred feet high. The average size is seldom two feet; they are relatively of low growth and rapid taper, apt to be too knotty, and in open exposures branch to their bases. In the governor's yard were some masts and spars over a hundred feet in length, scarcely tapering two inches in thirty or forty feet; yet these were from Kadiak Island, so that good

timber of this spruce may be obtained, although we had no opportunity of seeing noteworthy specimens in a growing state. Many masts and spars are obtained on Spruce Island, ten to fifteen miles distant, from whence they are floated in rafts.

The mountains are covered with herbage to their summits; grass grows two and three feet high over the gently sloping hill-sides; is cut about the first of August, stacked in the open air, and is well cured and sweet.

At St. Paul and upon the lands about the settlements on Spruce Island we estimated the number of cattle at two hundred.

The vegetable productions of Unalaska were found similar to those of Sitka and Kadiak; but no trees exist west of the middle of Kadiak and the peninsula abreast of it. Turnips and potatoes are cultivated by a few of the Aleutians, after removing the covering of sphagnum from the soil; and were there any proper and cultivated incentive to industry and improvement, no one can doubt the capability of the soil for affording fair returns. Bishop Veniaminoff says that the potato yields from four to seven fold and attains "great size," when three to ten make a pound weight! He is our authority for saying that among the mountains of Unalaska are found great numbers of dead willows.

At Kadiak and Unalaska we found the *Elymus* growing to the height of five feet, with a strong, heavy stalk and a head five inches long; in August it was nearly ripe and seeds were brought east. The grains were numerous as in a head of wheat, and fully as large as those of our best oats. This is the "wild wheat" of the early English fur traders.

The botanist of the expedition in his report remarks:

"Where grain-like grasses grow, and mature well, it seems fair to infer that oats and barley would thrive, provided they were *fall-sown*, like the native grasses, which are often in such haste to take root that they even sprout in the ear before reaching the soil. This is abundantly verified by reference to our collection. Several of these grasses had already matured and cast their seed before we arrived, showing sufficient length of season."

We found growing in Unalaska Bay, in great quantities, in certain localities, the pea called by botanists *pisum maritimum*, and from its luxuriance and size have little doubt but that it could be readily cultivated. It was found in all the stages from flowering to the ripe fruit on the 7th of September. Seed was procured for growing on the Atlantic coast, but it did not germinate. Lisiansky found it on the shores east of Cape Edgecumbe. Throughout the whole country the fields are brilliant with many colored flowers, gratifying the eye, and satisfying the explorer that the country has a moderate climate.

The navigators of the Russian-American Company inform us that the productions of all the islands to the westward are similar to those of Unalaska. Teben koff says that the potato is cultivated by the inhabitants in every village of the country.

We have no available sources of information concerning the vegetation north-

ward of the peninsula of Alaska from Bristol Bay, in 58°, to the mouth of the Kwichpak,* in latitude 63°.

Further to the northward, we have the evidence of Seeman, in his "Botany of the Voyage of H. M. S. Herald, 1845–'51," to show that the coast even in this high latitude has a vegetation due to a much lower latitude. He says: "the climate is considerably milder than that of the eastern shores of America in the same latitude. The proofs we need not deduce from artificial tables; nature herself has written them on the face of the country. The abundance of animal life, the occurrence of many southern plants, and above all, the limit of the woods, if compared with the opposite shores, furnish indisputable evidence. On the eastern side of America no forests are found above the mouth of the river Egg, above the sixtieth degree of latitude; on the western they extend as far as latitude 66° 44′, or nearly seven degrees further towards the pole." "The summer sets in most rapidly, and the landscape is quickly overspread with a lively green; flocks of geese and ducks arrive from the south; the plover, the snipe, and many other birds enliven the air with their notes." "The sun is now always above the horizon, and the rays falling continually upon the surface of the earth prevent the temperature from cooling down too much; and thus, notwithstanding the low altitude of the sun, a degree of warmth is produced which, under other circumstances would not be possible, the thermometer rising as high as 61° Fahrenheit. With the sun shining throughout the twenty-four hours the growth of plants is rapid in the extreme. The snow has hardly disappeared before a mass of herbage has sprung up, and the spots which a few days before presented nothing save a white sheet, are teeming with an active vegetation, producing leaves, flowers, and fruit in rapid succession."

The whole country, from Norton Sound to Point Barrow, is a vast moorland, whose level is only interrupted by promontories and isolated mountains. The rain and snow-water, prevented by the frozen condition of the soil from percolating through it, form numerous lagoons, or, when the formation of the ground opposes this, bogs, the general aspect and vegetation of which do not materially differ from those of northern Europe, being covered with a dense mass of lichens, mosses and other uliginous forms. Places are covered with plants and sometimes difficult to pass. "Wherever drainage exists, either on the shores of the sea, the banks of the rivers, or the slopes of the hills, the ground is free from peat. Such localities are generally clad with a luxuriant herbage, and produce the rarest as well as the most beautiful plants."

"The aspect of some spots is very gay. Many flowers are large, their colors bright, and though white and yellow predominate, plants displaying other tints are not uncommon. Cape Lisburne, (in latitude 68° 52′,) one of the most productive localities, looks like a garden."

"Inland from Norton Sound, about ten miles, groves of white spruce trees and *salix speciosa* are fragrant; northward they become less abundant, till in latitude 66° 4′, on the banks of the Noatak, the *pinus alba* disappears."

5 *Now Known to be the Youkon

To prevent the ravages of scurvy, the Esquimaux "collect for their winter stock, raspberries, whortleberries and cranberries, which are placed in boxes and preserved by being frozen into such a hard mass that in order to divide it recourse must be had to the axe."

"In the sub-arctic regions there are plants which the eye is accustomed to meet in the plains of more temperate climates. * * * * besides annuals and biennials, and shrubs and trees." "A peculiar feature of the vegetation is its harmless character. The poisonous plants are few in number, and their qualities by no means virulent."

It is a curious fact that throughout our exploration no reptile, toad, lizard or similar animal was seen, and Seeman states the same in regard to the arctic and sub-arctic regions.

Captain Thomas informs us that this season (1867) in the Arctic has been remarkably open, and that he reached the latitude of 72° 55′. From the position of Plover Island, north of 71°, he skirted the low coast to the north-northwest and to the west-southwest, and saw it stretching far westward to include the "extensive high peaks" of the maps. So this Plover Island is only a hill forming the eastern termination of a very extensive land, which was covered with a very luxuriant coat of green in August and September.

Here it may not be out of place to state that Captain Long, of the American whaler Nile, in August of the same year, skirted the south shore of the "extensive high peaks" from the above low ground, which he did not see, in 179° to 181½°. He found a volcano thereon, having an elevation of two thousand four hundred and eighty feet. This is now denominated "Wrangell Land."

MINERALS.

Of these little is known, and Prince Maksutoff, late governor of the Russian colonies, acknowledged that the company had been so persistently engaged in procuring furs and studying the best methods of keeping up the supply, that no thorough mineralogical exploration had been made, although a large cabinet of mineralogical specimens for comparison had been furnished by the company to the chief establishment at Sitka. Under his direction the very few specimens of Alaska minerals in possession of the servants of the company were transferred to the coast survey and referred to the geologist.

The great desideratum of the Pacific coast is coal, and we had been led to suppose that some of the reported deposits in Alaska were really coal, but the specimens from the island of Unga, given to us by the governor, are nothing more than lignite, thickly marked with iron pyrites. Moreover, at the worked out-crop in Coal Harbor it exists in veins of rarely more than a foot in thickness. This coal has been faithfully tried on the Russian steamers, and after very many experiments has been abandoned and recourse had to the Nanaimo coals from Vancouver Island. The navigators and engineers of the Russian steamers report that it is very light, burns with great rapidity, and leaves very much ash and

clinker. The same general remarks perhaps apply to the coal obtained from English Harbor, at the entrance to Cook's Inlet, and first found and reported by Portlock. But at the northwest point of the entrance to Tchugatchik Bay, under the anchor point of old navigators, there is an unworked vein of coal of seven feet in thickness, and this or similar veins crop out upon the shore of Cook's Inlet for twenty miles to the northward towards Anchor Point. This coal has not been opened on account of engineering difficulties; but a special survey of Tchugatchik Bay was made to exhibit its location. This has been forwarded to the Coast Survey office.

Wrangell says there is coal along the east shore of Cook's Inlet, southward from Cape Kassiloff. Wosnessensky gives details of this formation with a profile of the three layers as they are seen cropping out on the bluff shores. A little north of Cape Staritschkoff (Stuk-talj-chin) the coal first exhibits itself in two parallel layers, about one hundred and fifty paces from a poorly supplied waterfall, which is nevertheless distinguished by a deep and wide basin. The veins are about one and a half feet thick, and lie from six to ten fathoms below the top of the bank. A little to the northward a third is added; the thickness of the larger decreases from the uppermost. The three continue nearly to the first point of Cape Neniltschik, (or Sanil,) with a dip towards the north-northeast; they disappear at the flat coast line at the mouth of the river Chuick-chak, where a subterranean fire in the veins burned in 1829 and 1830. They reappear at the second point of Cape Neniltschik with a dip to the south-southwest, and thence nearly horizontal to the mouth of the first stream south of the Kassiloff River. Mining Engineer Doroschin carried specimens of this coal to San Francisco, and it was reported upon favorably. (Grewingk.) Two positions are reported to furnish coal. One has been worked and tried by the Russians, and condemned. The location was near Hood's Bay, on the east side of Chatham Strait, abreast of the eastern entrance to Peril Strait. Indians report coal at Point Gardner, in Chatham Strait, at the entrance to Frederick Sound, in latitude 57° 01′. Examinations in May, 1868, show that coal exists in Port Camden, opening upon the south shore of Frederick Sound, about eight miles east of Chatham Strait, in a position on the map about latitude 56° 42′, longitude 133° 50′. The coal crops out about twenty feet above low water mark, occurs in several veins, with intervening strata of hard rock, the veins about six inches in thickness, at varying distances of twenty to fifty feet of each other, increasing in thickness inwards, with a dip of 35° or 40° to the southward, and a direction nearly east and west: good anchorage here, from six to fifteen fathoms, over soft bottom: rise and fall of tides about thirty feet: surrounding country thickly wooded.

The most important discovery was made by the Coast Survey in October, 1867, in the valley at the head of St. John's Bay, opening upon Newski Strait, about seventeen and one-half miles northward of Sitka. Pieces of coal largely intermixed with rock, to which their preservation was due, were found for four or five miles along the bed of the small but rapid stream. After a second partial

exploration and obtaining large specimens, it was believed the coal was anthracite, but a subsequent analysis in San Francisco proved it to be bituminous; but from all the geological evidence the geologist reported that the bed or beds from which it was broken will, if discovered, afford coal of vastly superior quality to any heretofore known to exist in the territory; and the government was advised to direct an exhaustive examination of this locality. Recent information has been received that this coal vein, which has been discovered, is of great thickness, is anthracite, has been burned on a United States steamer, and reported upon favorably.

The general course of the stream upon which specimens were found is east and west; its rise for the first four or five miles is not very rapid. Along its banks are small areas of flat alluvial land, particularly near its mouth. The channel often separates into two or three, inclosing small islands on the level bottom land. The rocks in situ are rarely exposed, but at two points on the stream fine black shales and soft friable sandstones, without fossils, however, were seen trending approximately northeast and southwest, and inclined at a high angle. Pieces of coal, much intermixed with foreign substances, principally limestone of greater or less size, were found along the course of the stream for a distance of four miles. Highly crystalline limestone, white, streaked with gray, was also found in the detritus. The dense growth of timber, thick masses of fallen and decaying trees, covered with deep moss, thickets of the thorny shrub, *panax horrida*, and the general mountainous character of this locality, will render its future exploration exceedingly difficult.

Should petroleum come to be used as a steam-producing fuel on steamships, there is a prospect of a supply being obtained from the southeast shore of Alaska Peninsula, at or near Katmay Bay, in latitude 58° 01′, longitude 154° 54′, and abreast of Kadiak Island. The governor furnished the Coast Survey with a specimen of the crude oil obtained there two or three years since. The finder (a teacher in the Russian-American Company) reported that he found three streams in the above locality covered with petroleum.

Specimens of pure copper have been gathered from various localities, but the principal source is on the Atna or Copper River, about twenty-five or thirty miles above its mouth, where discovery and research are retarded on account of the reported hostility of the natives. We have obtained from Mr. Klinkofstrom, Russian consul at San Francisco, a specimen of this copper; and masses of about a cubic foot are procured from the river. All the peculiarly-figured copper plates of the natives, twenty-six by fifteen inches, and so much prized as heirlooms by the Indians as far south as Vancouver Island, are hammered out of pure copper obtained from this river.

Copper combined with quartz is found in several localities, and Bishop Veniaminoff says that near Makushin Bay, between the distant pass and the Tarasiousky Bay, there exists a lake high among the mountains, and that metallic copper is found along the shores of the lake.

Silver has been reported in several places, but when the Coast Survey sought the localities the guides could not point them out. At St. Paul we found specimens of quartz with sulphate of iron and lead. Upon analysis in San Francisco it was found to contain only $4 15 per two thousand pounds and had in it a trace of gold.

Gold is found on the Stikine River, and even with very crude means of working the miners report that they can make from $2 to $7 per day, but the climate forbids them working more than six months of the year. Proper methods of working the fine gold placers of this river would yield twice the above amount. Gold is reported to have been found by Mining Engineer Doroschin on the Kaknu River, which enters Cook's inlet on its eastern shore about latitude 60° 32′, at the Russian station of St. Nicholas, but we have no authentic information on the subject beyond the statement by Tebenkoff. While we were at Sitka experienced miners made two prospecting tours over part of Baranoff Island, but without finding the "color." The slate and quartz formation around Barlow Cove, at the head of Admiralty Island, on Chatham Strait, in latitude 58° 24′, is almost an exact counterpart of many rich gold localities in California, but the heavy weather that prevailed while we were there a few hours prevented any other than a casual examination of one view of quartz five feet thick cropping out upon the shore. It was much disintegrated and abounded in iron pyrites.

In Little Naquoshinski Inlet, fifteen miles from Sitka, the Coast Survey party discovered very fine marble in inexhaustible quantities, and at the mouth of the Chilkaht specimens of marble of a very coarse grain, and others of a remarkably fine crystallization, were discovered, all being white, very pure and unmarked.

On the flank of the mountain Vostovia, which attains an elevation of three thousand three hundred and eighty-one feet, bismuth of remarkably pure quality is said to be found, my informant being one of the Russian-American Company's officers. The weather was so shockingly bad and the season so late, that it was impracticable to send a party of exploration, although the time would occupy but one day. The specimen obtained was said to have come from the Koloshes River, but that appeared doubtful, as it was not water-worn, and the geologist made two explorations up the river for two or three miles without discovering any signs.

Iron ore is reported in the vicinity of Sitka, but after two searches in the localities indicated the examination was abandoned; yet in this case the failure is attributed to our informant's inaptitude for topographical description.

Kotzebue states that his compass in Chamisso Island, in the eastern part of Kotzebue Sound, gave a variation of only 1° east, instead of 32° east. On the point in the southeast part of the sound where the mammoth remains are in latitude 66° 15′.36, the magnetic needle gave a variation of 16° west instead of 32° east. On the summit of St. Paul Island, in the Behring Sea, he reports the compass "turning all round," so that he could get no bearing until he changed his location.

The hot springs lying on the southwest part of Sitka Sound, about fifteen

miles from Sitka, were not visited, and we know nothing more than the meagre description of Lisiansky, Simpson, and others. There are four distinct springs issuing from fissures in the granite rock. At its source the principal spring has a temperature of 153½° Fahrenheit, and is chiefly impregnated with sulphur, but has also salt and magnesia in solution. There is also a large basin purposely dug in the ground to receive the waters of the springs, about two or three hundred yards from the beach and about fifty feet above high water; in it the water has a temperature of about 100° Fahrenheit. The two substantial buildings of hewn logs erected by the Russian Company for hospital cases of chronic, rheumatic, and cutaneous diseases, are situated on the sloping face of the bank.

In front lies a pretty little cove, completely sheltered by an archipelago of small wooded islands; in the rear is a barrier of rugged mountains; while immediately within the influence of the warm waters and continually rising vapors, there grows a luxuriant verdure even when all around is clothed in snow. The adjacent waters are alive with fish and fowl, and the land teems with deer and other game.

Eschscholtz found the temperature of hot springs in a meadow opposite the entrance to Ilioulíouk Harbor, Unalaska, 93° or 94°; other hot springs near Makushin Mountain were tasteless and without smell. On Akutan he reports a hot spring in which meat was thoroughly boiled in a short time. Sulphur is found by the natives in all the volcanic regions.

Graphite has been reported on the northern coast, and Kotzebue says that the natives of St. Lawrence Bay, on the Asiatic coast, nearly abreast of Cape Prince of Wales, possessed a tolerably large quantity of a fine graphite.*

FUR-BEARING ANIMALS.

Of the number and value of the different varieties of skins obtained from the Indians by the Russian-American Company it is impossible to form an opinion, as the very existence of their trade depended upon the secrecy with which it was conducted. That the company has been able to maintain a large establishment in persons and material is strong circumstantial proof of the value of the trade. The almost absurdly small amount of trading articles paid to the Indians for their most valuable skins was ascertained to be marvelously low compared to their prices in our markets. The organization of the company has been, in fact, that of a colonial government, and the governor of the company must be an officer of the imperial army or navy, with power over all cases not involving death as a punishment; and all the soldiers are selected for their expertness in the various handicrafts. The immediate traffic of the company has given trade to not less than ten thousand Russians, Aleutes, Esquimaux, &c.; besides fifty-eight hundred Koloshians, who act as inter-traders with the numerous Indians of the interior. The company has numerous stations or factories throughout the length of

*Probably *micaceous oxide of iron*, which is abundant, and used as a pigment by the natives.
W. H. DALL.

the coast and among the Aleutian Islands; maintaining nearly one thousand people regularly; two fine steamers and several smaller ones, six or eight barks, brigs, &c., and numerous boats.

The value of the furs may be estimated yearly at not less than one million of dollars in gold, as the company insure their regular shipments for six hundred thousand dollars. By the time these furs reach our markets they are doubled in value.

The Hudson Bay Company had purchased right to trade in certain localities on this coast, and their traders have availed themselves to the uttermost to obtain the greatest possible supplies. From the mouth of the Chilkaht alone they took this year over twenty-three hundred martens or "American sables."

It is useless to enter into the description of the different kinds of furs upon the coast, or of the habitat and relative abundance of the different animals. The governor of the company had a map in colors exhibiting at a glance the habitat of every fur animal and its frequency.

The policy of the company has been to maintain a regular supply, and to this end they place restrictions upon the trade, even designating islands and localities where the animals shall not be taken. When the supply of any animal is running short, or an island is found peculiarly adapted to support certain kinds, a stock is placed upon the island and the natives forbidden to hunt there for a series of years.

The use of fire-arms is prohibited in the pursuit of certain animals, as the noise is certain to drive them away. The number of sea-otter skins now annually obtained does not amount to over eleven hundred, where the supply seventy years since, in the Alexander Archipelago alone, was eight thousand, of which it was confessed that the American fur traders secured over sixty per cent. Between Yakutat Bay and Dixon Sound, Tebenkoff says that not a single sea-otter is found, attributing their absence not so much to their destruction as to the noise of fire-arms.

An important consideration in sustaining the value of the fur trade, and thereby continuing an industrial pursuit to the natives, will be the rigid governmental direction of the proper seasons for killing the different fur-bearing animals, and to a certain extent the manner of taking them. Where the practice is to kill by spears and arrows, without guns, it will be wise to continue the custom, at least until the inhabitants have become accustomed to the new order of things, and the habits of the traders. Where the practice prevails to kill with fire-arms, it appears politic to permit the sale of inferior powder and arms in prescribed quantities, otherwise those natives obtaining fur-bearing animals and game by these means will be at a loss to keep up the supply with bows and arrows, which they have abandoned many years. Every Indian in the Alexander Archipelago and along the main possesses one or more muskets and one or two single or double-barreled pistols; bows and arrows are unknown, except as mere matters

of trade as curiosities, and for those purposes obtained from interior or very distant tribes.

In a few years the whole fur trade will degenerate into an illicit traffic with whisky smugglers, unless the most rigid and inflexible means are employed to regulate it. The Indians themselves give aid and comfort to the smuggler by timely warning of approaching danger, by false information to the officers of the law, and by secreting the small vessels of the smuggler when being searched for. The thousand harbors of the coast, the thick weather, and the multitude of channels and straits, many of which are not even yet laid down, give the advantage to the smuggler.

THE FISHERIES.

Next to the fur trade, in its legitimate pursuit, the fisheries of the coast of the new territory will prove the most valuable and certain; in fact, I consider them the most important acquisition to our Pacific coast. As the banks of Newfoundland have been to the trade of the Atlantic, so will the greater banks of Alaska be to the Pacific; inexhaustible in supply of fish that are equal if not superior in size and quality to those of the Atlantic; and the pursuit thereof developing a race of seamen yearly decreasing, as our steam marine, commercial and naval, is increasing.

We have the reiterated and disinterested statements of all the old navigators and fur traders, that every part of the coast abounds in cod, halibut, salmon, and every variety of fish inhabiting comparatively cold waters, and the experience of the present expedition established the truthfulness of their descriptions.

Salmon.—At some of the entrances to shallow fresh-water streams the water is packed with salmon, and the bears come down in numbers to feed upon them, selecting the heads only. On some of the beaches, near these streams, the seine will take them in thousands. In the bays leading to the small streams at their head, on the southeast side of Alaska Peninsula, the salmon are crowded so thickly that the progress of a boat is impeded, and should a southeast storm arise at such times the fish are driven on the beach in innumerable quantities; one of the Russian navigators assures us that he has seen the beach strewn two to three feet thick with the stranded salmon.

The United States Coast Survey has made a sketch of the outlet of Gloubokoe, or Deep Lake, on the south side of Sitka Sound, where the Russian-American Company have built dams, traps, foot-bridges, houses, &c., in the most substantial manner. The dams and traps lie across the upper part of the rapids, which have a fall of nine feet over rocks. The traps are large rectangular spaces made with stakes placed perpendicularly and near enough to each other to allow a free flow of water, and yet prevent the salmon passing between them. The side of the trap towards the descent has an opening like the entrance to an ordinary rat-trap on a large scale. The fish rushes up the rapids and passes through this opening to the staked inclosure, where it remains swimming against the moder-

ately strong current. When several salmon have entered they are lifted out by a kind of wicker basket and placed in large boxes lying between the traps, of which there are six, with means of adding as many more. The last year's catch that was packed for market amounted to five hundred and twenty barrels, containing from eighteen to twenty-five salmon each. As high as one thousand salmon have been taken in one day. In 1868 the year's take, under the impetus of American enterprise, was two thousand barrels.

At Karta Bay, in Clarence Straits, there is a Russian trading post and salmon fishery that expects to put up three thousand barrels of salmon in 1868.

The great winter food of the natives is dry and smoked salmon, of which they lay in very large supplies.

Seeman says that "salmon, so frequent in Norton Sound, latitude 64°, are not found to the northward of the river Buckland, emptying into Kotzebue Sound, in 66° 05′; they appear, however, to be superseded by the mullet, which attains a considerable size. He obtained for a blue bead a mullet thirty-three inches long, weighing twenty-one pounds."

Cod.—But the most valuable fish on the coast is the cod, and, so far as ascertained, it has already been very profitable to those interested in it, although in one or two instances losses have occurred by finding the cargo improperly cured. Those persons interested in it refused for two or three years to give detailed information of their outfit, catch, profits, or banks where the fish were caught.

The richness and availability of the cod banks were first demonstrated in 1864, in the Ochotsk Sea, near the Saghalin Island. All the vessels of 1865 resorted there; some fishing along the west shore of the Kamtschatka Peninsula.

The time for reaching the Peninsula of Kamtschatka is about the 1st of July, and the average length of passage from San Francisco to Cape Lopatka, the southern extremity of Kamtschatka. But in the Kurile Strait small good fish may be taken as early as the 1st of June. At this date the fish are not found on the west coast of the peninsula. In July fish may be taken in moderate quantities on the southeast side of Cape Lopatka, and in the western part of the Kurile Strait; but the best fishing ground commences about forty miles northwest from Cape Lopatka; at the first of the season near the shore, but extending twenty to twenty-five miles from the land in latitude 52° 30′ to 53°. When the fish come upon the west coast of Kamtschatka about the 1st of July they are thin and poor, but improve rapidly. On this ground they are usually taken in twenty-five to thirty fathoms of water, though they are found in sixteen fathoms, say within three miles of the land. They are caught as far off as twenty miles from shore in depths from forty-five to sixty fathoms according to latitude.

Fish taken here two weeks after their arrival on the ground are a little larger than those taken on the coast of Labrador, but not so large as those taken on the Grand and other off-shore banks in the Atlantic. In quality they compare very favorably with the latter.

For bait the vessels have taken salt herring from San Francisco: some carry fresh herring from Petropaulski in snow and ice; others use the small halibut caught on the cod banks.

In 1866 twenty-three vessels, comprising barks, brigs, and schooners, started from San Francisco for the various fishing grounds, but concealed their particular destinations; their time for leaving San Francisco is as early as March, arriving on the grounds in April; and they should leave about September. More than half these vessels visited the Ochotsk Sea, but the rest fished off the Fox and Shumagin Islands.

Two or three small schooners sailed from Victoria and made fair catches, so much so that the importation of cod into the ports of British Columbia has ceased.

The amount of fish brought into the San Francisco market in the seasons from 1864 was as follows: In 1864, forty thousand fish, weighing one hundred and twenty tons; in 1865, two hundred and forty-nine thousand fish, weighing five hundred and twenty-three tons; in 1866, seven hundred and six thousand two hundred fish, weighing one thousand six hundred and fourteen tons; and in 1867, nine hundred and forty-seven thousand two hundred and sixty-four fish, weighing two thousand one hundred and thirty-four tons. No tongues and sounds were quoted, and were evidently not saved; and only a small quantity of cod-liver oil was saved by one of the vessels from Victoria. The imports of codfish from the Atlantic States for the years 1862, '63, '64, averaged nearly five hundred tons, so that the Alaska supply overstocked the market in the absence of new outlets. In consequence of this the number of vessels cleared for Alaska cod banks in 1868 was but twelve, with an aggregate tonnage of one thousand four hundred and twenty-four, against two thousand one hundred and thirty-four in 1867. The average trip to the Shumagin Islands is reported about one hundred and ten days, and to the Ochotsk one hundred and seventy days; a saving of two months and nearly two thousand miles in favor of the former.

The waters between the Alaska Peninsula and the Shumagin Islands are well protected from the heavy swell of the Pacific. All the California fishing vessels now resort to the grounds about the Shumagins, where fish are very plentiful and superior to those taken in the Ochotsk Sea. Among these islands are many good harbors; fresh water is everywhere readily obtained; and some drift-wood for fuel may be procured from the shores. But the greatest advantage is that vessels when fishing may always lie under the lee of some one of the numerous high islands, thus making fishing a much more comfortable business than when riding out in the open sea.

In this vicinity there appear to be two kinds of codfish, one of which is small, but of good quality. These have always been found by the fishermen, no matter how early or late in the season the vessel arrived upon the ground—say from the first of May to the last of September. The other kind is considered migratory; arrive about the 10th of May, and leave some time in September. These latter

are a little smaller than the Ochotsk fish when taken, but when dried turn out heavier.

The kind of bait used here is salted herrings from San Francisco, and halibut and sculpin caught on the ground.

It has been the practice of the vessels among the Shumagins to run on Saturday night for Coal Harbor, on the north end of Unga, and remain there over Sunday night, when they again start out for a week's fishing.

The winds about the Shumagins and in the Ochotsk Sea from June until the middle of August are from the southeast with rain and fog; and from the middle of August to the middle of September from the northwest, with fine weather and smooth water; after which there are heavy southerly gales.

In our voyage to Kadiak and Unalaska, and returning to Sitka, we saw none of the numerous fishing fleet that was out this season, probably on account of the lateness of the season.

The supply from the Alaska banks has stopped the importation of codfish from the eastern ports to San Francisco, and when the curing process is properly understood and carried out, the Pacific coasts of America and Asia will become consumers. The yearly supply from the Atlantic States was about five hundred tons; but the cod fleet brought in about three times this amount in 1867, and overstocked the market. In 1868 only nineteen vessels left for the cod banks.

The fish have not been cured on the Aleutian Islands because the territory belonged to Russia, but were kept in salt as long as six months, or until the return of the vessel to San Francisco, evidently to the injury of the cargo. Many of the persons engaging in the business knew nothing of the manner of catching or of curing the fish, yet the prices commanded were from thirteen to seven and a half cents (gold) per pound; and last February the average rate was nine and a half cents. One vessel carried a full cargo direct to Australia, and received eight cents per pound.

The large amount of fish consumed in California has always created and sustained a large demand, and the new cargoes have been quickly disposed of at rates ranging as high as thirteen cents per pound. The southern coasts of America are almost wholly Catholic in their population, and so soon as the fish are well cured, the demand from that source will increase. It is doubtful whether we can compete with the Asiatic fishermen in their own ports.

Some of the vessels are said to commence fishing along the Alaska coast north of 54° 40′, and to work northward along numerous banks which they appear to have found. The fish are taken in from fifteen to forty fathoms of water; the best fish in the deepest water.

It has been found practically that the Ochotsk Sea is too distant from San Francisco, and the fleets of 1867 and 1868, from San Francisco, fishing among the Fox and Shumagin Islands, report that wherever the water is sufficiently shoal the cod is very abundant. In 1866 the largest takes were among the Shumagin

Islands, off which we got soundings this year in forty and fifty fathoms at a distance of thirty-five miles.

The soundings of Portlock, of Vancouver, and of this expedition prove the existence of a comparatively shoal bank, extending along the southeastern coast of Afognak and Kadiak, with a deep pocket of ninety fathoms, no bottom, twenty-five miles east of St. Paul. The shoalest water obtained on this bank by this expedition was forty-five fathoms in latitude 58° 16′, longitude 149° 42′. It is fair to assume that this bank extends along the southeast shore of Kadiak, as incidental and unconnected observations indicate. Belcher anchored under Cape Greville, the eastern point of Kadiak, in an excellent position, and his crew caught cod and halibut from the vessel. South by east fourteen miles from the eastern end of the easternmost of the Trinity Islands Vancouver found bottom at fifty fathoms. Soundings on the English Chart No. 2172 give fifty-five fathoms nearly midway between the Trinity Isles and Úkamok Island, which lies on the prolongation of the longer axis of Kadiak, fifty miles from the Trinity. Fifteen miles south of Úkamok Vancouver got seventy-five fathoms, sand and shell bottom. In latitude 55° 16′, longitude 156° 07′, thirty-six miles south 31° west from the south end of Úkamok Island, Lisiansky found eighty fathoms over grey sandy bottom. Thirty-five miles east from the south end of the island of Niuniak, the southernmost of the Shumagin Islands, we obtained coral and sand bottom in forty fathoms of water; the position is in latitude 54° 38′, longitude 158° 30′. Ten miles further westward the depth of water was fifty fathoms. In neither of these localities were any attempts made to fish.

Tebenkoff gives soundings of forty-five fathoms fifty miles south 83° west of the southernmost point of the Shumagin, on the line and nearly half way towards the dangerous reef and island of Sanak. From that position the nearest islands to the northward are about thirty-five miles distant. In latitude 54° 20′ and longitude 162° 30′, about nine miles southeast from the Sanak reef, we got bottom in thirty-five fathoms, rock and barnacles being brought up by the lead.

In nearly this last locality Cook caught over one hundred halibut ranging from twenty to one hundred pounds each. He therefore applied the name Halibut Island to it.

The bank where trial was first made for fish was found on the fifth of September, during a prevalence of thick weather. We fortunately seized an opening and obtained good observations for longitude; with an approximate latitude, the position is in latitude 53° 35′ and longitude 164° 10′, and near it soundings were obtained in fifty fathoms of water, the lead bringing up sand and a small star-fish. With thick drizzly weather the vessel drifted to the northwest by compass, until sixty fathoms were struck with sandy, pebbly bottom. Here the lead-line was baited, and while on the bottom the first cod took the hook. The fish proved very plenty, fat, and bit eagerly; frequently two were brought up on a double-hooked line, and sometimes three were brought up on a line with three hooks. The largest measured thirty-seven inches in length, and several reached thirty-six

inches. The finest was thirty-six inches long, twenty-three inches girth, and weighed twenty-seven pounds; was very fat, and certainly of as fine if not finer flavor than cod we had eaten eleven months before, freshly caught on the south coast of Newfoundland.

The vessel drifted all the afternoon over this bank, with the same depth of water and fish biting well, although all appeared in capital condition and their maws full of food, such as squid, halibut-head, fish the size of a herring, sea-lice, &c., &c. We got no observations that noon or afternoon, nor any all the next day, on account of thick, foggy, drizzling weather, but the vessel could not have been far from latitude 53° 40′ and longitude 164° 30′, lying sixty-five miles east-southeast true from the middle of the Akoutan Pass, and forty miles south-southeast from the Unimal Pass. The weather was altogether too unfavorable to make an extended examination of this locality. The fifty-fathom position is forty miles broad off the nearest island of the Kriniatzin group, lying between Únimak and Unalaska. Much deeper water, one hundred and four fathoms, over a bottom of black sand, was subsequently found in latitude 53° 38′, longitude 165° 25′, forty-three miles westward of the above cod bank, and twenty-five miles broad off the islands.

In addition to the already acknowledged success of the cod-fishers from San Francisco and Victoria, and our experience, we have that of Captain Bryant, formerly a whaler in the North Pacific: "Behring Sea is a mighty reservoir of cod and halibut, so that he never threw over his lines without bringing up fish in whatever part of the sea he might happen."* The soundings of this sea, and of the Arctic Ocean north of Behring's Strait, indicate it as the most remarkable submarine plateau of such great extent yet known. On the eastern half of this sea soundings of less than fifty fathoms are found over an extent of eighteen thousand square miles.

The old navigators and fur traders found cod in all the harbors on the coast and wherever they fished for them. Kotzebue alone declares "he saw no fish on all the American coast; we often threw out our lines, but all in vain. I believe, therefore, either there are no fish here at all, or they do not resort here at this season," July, August, and September. Speaking of the archipelago Alexander, Lisiansky says "the rivers abound in fish; herring swarm in Sitka Sound every spring; fine codfish and halibut of large weight may be caught with the hook and line." Cook in his third voyage caught cod in latitude 54° 07′, longitude 164° 25′, about seventeen miles southeast from Únimak Strait in forty-two fathoms. He obtained cod from the Aleutes in Samganuda Bay, at the northeast part of Unalaska Island, opening on the Akutan Strait.

In Behring Sea, in latitude 55° 48′, longitude 162° 42′, about twenty miles broad off the northwest shore of the Alaska Peninsula, he "caught a good number of fine codfish" in thirty fathoms. In Bristol Bay and River, emptying into

*There are no cod north of the line of floating ice before mentioned, from the best information I have been able to obtain. There are at any rate none in Norton Sound.—W. H. DALL.

the Behring Sea, where salmon were in great abundance, he found that fish "in the maws of cod which he had caught." In the same bay, southeast Hagmeister Island, in water of fourteen to twenty-six fathoms, he "had tolerably successful fishing, catching cod and then a few flat fish." In latitude 61° 48′, longitude 180°, St. Thadeus Nose bearing north-northwest about twenty-three leagues distant, he caught "abundance of fine cod" in sixty-five to seventy-five fathoms water. His successor, King, in September 1779, in latitude 59° 38′, longitude 177°, about one hundred and fifty miles west by south quarter-south from the island of St. Mathew, "got a great number of cod in seventy-eight fathoms." Portlock obtained large quantities of fine cod, halibut, crabs and muscles in Port Etches. Captain Bryant says: "South of Alaska, at a distance of say fifty miles from shore, there are banks running parallel to the coast admirable for cod-fishing; these banks can usually be recognized by the lighter color of the water."

The banks along the shores of Alaska bordering the Gulf of Alaska, around the Kadiak group and part of the Aleutian chain, will add not less than forty-five thousand square miles, with a depth of not over fifty fathoms, to the eighteen thousand miles of the Behring Sea. If the fishing depth is extended to one hundred fathoms there is little doubt that the cod-fishing area will reach one hundred thousand square miles.

The fishing smacks carry their bait from San Francisco at a cost of about one hundred dollars in gold for a one-hundred-ton vessel. We fished with clams, the *schizotherus nuttallii*, obtained at Port Simpson on our way up; but there are plenty of small fish, herring, clams, &c., suitable for bait, in all the harbors along the coast. The clam hangs best to the hook. In this connection it may be stated that experience has proved the muscle of Alaskan waters to be very frequently poisonous. This is, without doubt, the case at certain seasons, as proved by Vancouver, Kotzebue, and others. But Portlock appears to have used them in large quantities in Port Etches; and Lisiansky speaks of them as if used regularly on his vessel.

The importance of the possession of the Aleutian chain can hardly be overestimated; not only can our fishermen enter and fish in every bay when heavy weather compels them to leave the banks, but they give ample opportunities for the successful curing of the fish, certainly as great, if not greater, than exists on the south shore of Newfoundland. Instead of making the long trip to and from San Francisco, and of keeping the fish so long in salt, especially if imperfectly cleaned, it appears feasible to make a general depot and curing establishment, as at Kadiak, whence vessels could carry the catch of all the smacks, which might readily refit in winter and be ready for the opening of the next season. Kadiak is mentioned as affording the nearest available timber for repairs, and as already a depot for the ice crop of the Pacific.

In conversation with the governor of the Russian colonies upon the value of the cod fisheries, he acknowledged that the Russian government had not been aware of the extent, value, and importance of the cod grounds as a new industry

in the Pacific. While its commercial value is so great to us, it will prove of great service to the Aleutes, who are patient, skillful, and fearless in their fishing. Under proper guidance they may be very profitably employed in the taking and curing of fish; and in order that our fisherman may know where to find labor among these islands, we have procured from the priest of the Unalaska district the population of every village from Attau to Unga. These statistics will be found under the head of population, &c.

In addition to the fisheries of the great bank, the cod are reported to run in great numbers in the summer around and near the entrance to Hamilton Bay near the western part of Frederick Sound. Lisiansky says they may be caught with hook and line in Sitka Sound; Portlock caught them in Port Etches; Belcher caught them from his vessel inside Cape Chiniak, and doubtless many other localities will afford abundant local supplies.

Herring.—In September, when drawing the seine for salmon at Ilioulíouk Harbor, several herring were obtained of large size, fatter and of much finer flavor than the herring caught on the California coast. No information was obtained of the season when they visit the coast. They are found in the vicinity of Sitka, and doubtless visit the whole seaboard. Portlock mentions that "when hauling the seine, he caught large quantities of herring and some salmon. The herrings, though small, were very good, and two hogsheads of them were salted for sea store."

Lisiansky says: "Herrings swarm in Sitka Sound every spring."

Seemann says that the herring and whiting are caught in Hotham Inlet, in Kotzebue Sound, latitude 67°, in great quantities; and some of the smaller streams produce trout.

Wrangell says that shoals of herring ascend the Kolyma River, Asia, from the Arctic Ocean, but they appeared to come from the west towards the east.

The herring, besides its own intrinsic value, has an important bearing on the question of the cod fisheries in supplying bait, which is now carried from San Francisco for that purpose at large prices.

Whale.—The waters surrounding the Territory of Alaska have always been celebrated for their whale fisheries, and the Russian-American Company formerly paid some attention to this branch of industry and profit, and had surveys made in Cook's Inlet for ascertaining the proper anchorages and harbors for their whalers in winter. They even established a ship-building establishment in Resurrection Bay, on the eastern shore of the Kenay Peninsula, and employed an English superintendent, but as the whaling was not so remunerative as the fur trade, their whole efforts were directed to the full legitimate development of that business.

Some of the Russian navigators inform us that their best whaling ground, from the middle of June to the middle of July, was in the region named "Fairweather Ground" by the American whalers, and lying between the Pamplona Reef and the shores off Mount Fairweather. The richness of this locality is con-

firmed by all the old navigators and fur traders, who found these waters abounding in whales, especially in the region of the Barren Islands, between the Peninsula of Kenay and the island of Kadiak. As early as June 4, (1787,) Dixon, when four or five leagues off Behring Bay, found many whales playing about his ship.

Captain Bryant says that "Fairweather Ground" is at proper seasons the great receptacle of the mollusk called "whale's food," a minute animal, about the size of a flax seed; and having a gelatinous consistency, the myriads of them cover the ocean like a scum.

This mollusk drifts along with the coast current towards the west at the rate of about one mile per hour. During this season the sea and all the adjacent bays are filled with the whale. The mollusk collects under the lee of the submarine range of Pamplona. The whaling season continues from the last of June to the middle of July.

It becomes an interesting question to trace back the path of this mollusk; the indications of whale in the vicinity of the divide of the Japan current, about latitude 48° and longitude 148°, are such as to suggest the probability of the mollusk being brought by the great stream towards the coast. The old navigators notice many whales in that region as early as April.

The *clio borealis* inhabiting the Atlantic Arctic seas, is a small animal with a cylindrical head, body, and a pointed tail, but having in addition a pair of fins, by means of which it progresses. When the weather is calm they are so abundant that the surface of the ocean is covered by them. They swarm in such myriads as to serve as the great part of the food of the whales. This species is not found in the North Pacific, the principal food of the whale there being the "brit," which is composed of small crustacean and various species of salpæ.

Off the Barren Isles, at the entrance to Cook's Inlet, and off Cape Hermogenes of the Kadiak group, Dixon (1787) says the whales were so plentiful near the land that their blowing was frequently mistaken for the breaking upon a reef of rocks. Off the entrance to Cook's Inlet, Portlock writes in August, 1786, that "the whales on the coast are close in shore and in vast numbers;" again, "a very great number of Gallicia whales were seen near the shore, and indeed in every direction as far as the eye could reach."

Belcher says that in June, 1839, when anchored off Cape Greville, the easternmost point of Kadiak, "whales were swarming; the numbers seen spouting at the same instant seemed incredible, and can only be compared to the ricochet resulting from firing the broadside of a frigate."

Holmberg says that around the Kadiak group there is found but one species of whale,* (Balænoptera,) but according to its age the natives apply four different names, and almost exclusively catch those of one year old or less. The whales come into the bays about the middle of July, and can be hunted until the end of August.

* An evident error. (Dall.)

As this ground has not been fished for many years it appears probable that large numbers might be obtained.

Wrangell says that the inhabitants of the Tchukchee village, on the south point of Koliutschin, or Burney Island, in the Arctic, off the Asiatic shores, killed fifty whales, besides walrusses, &c., in the season of 1821. He says that a whale was killed on that coast having one of the stone spears of the Aleutes in its body.

About Unalaska we saw numbers of sperm whale in September; and in August the sperm whaler, William Gifford, was entering the north strait of Kadiak to fill up, reporting as having left the coast of Queen Charlotte Island, where four other sperm whalers were fishing this season. The Gifford had been out from New Bedford since November, 1863, her time being five years. She had sent home two thousand seven hundred gallons of sperm oil, worth $90,000 in gold, and had on board four hundred barrels more, intending to take nothing but sperm whale until near the end of her cruise.

A great many whales are found in the straits of the archipelago Alexander, but the very deep water is a drawback to successful fishing.

For the last six years the whaling fleet of the Arctic has averaged not less than eighty vessels, of which seventy belonged to the United States. Their average catch in those waters amounts to not less than twelve hundred barrels each, and about twenty thousand pounds of whalebone, reckoning the latter at sixteen pounds to the barrel of oil. The principal reason given by the whalers for preferring the Arctic regions over the Gulf of Alaska is the shallower water. In the Arctic Ocean and Behring Sea the depth of water is about thirty fathoms, and the whale, in "sounding," after being struck, dives his head into the muddy bottom, and has it covered with mud when he rises. The whaler learns readily where and when he will rise in such a depth, but in the deeper waters of the Gulf of Alaska the whale does not strike bottom in sounding, and it is very difficult to estimate where he will rise, and not unfrequently sounds again and again, and thus draws the boats far from the vessel.

The command of all the bays and straits of the northwest coast resorted to by the whale gives very great advantages to our whalers that need only be mentioned to be appreciated; fishing at all seasons, opportunites to winter and refit, depots for cargoes, and regularity in transshipping them to the east or to the Pacific ports. It opens the broad question whether the whaling cannot be more effectually and more profitably done in smaller vessels specially designed and constructed for capturing the whale, and then storing the oil at some depot in the Behring Sea, whence it can be regularly shipped to destination; while the whaling vessel, working until the latest day of the season, discharges her crew of Aleutes among their island homes, and lays up for the winter in Alaskan harbors, ready for the whaling grounds at the earliest opening of spring. If this be done, with the increased knowledge of the whale's habits and the aptitude of the Aleutes, the American whalers can sweep the field of foreign competition.

WALRUS IVORY.

Coal Harbor, on the north side of the island of Unga, has been the point for receiving the walrus tusks obtained from the Walrus Islands, on the north side of the Alaska Peninsula. During the winter the walrus is said to be driven by great bodies of ice into the larger bay, thirty miles long and ten miles wide, embracing the Walrus Islands. Here the natives kill them, secure the tusks, and trade them to an employé of the Russian-American Company stationed at the storehouse in Moller's Bay, at the mouth of a small stream in latitude 55° 55′, and longitude 160° 41′. Thence the stock is carried on the shoulders of the natives, or on dog-sledges, across the peninsula to the head of Portage Bay, twelve miles deep by four miles wide, lying north-northwest and south-southeast by compass, and directly north of Unga Island. In Portage Bay they are met by another body of natives in their bidárkas, or skin canoes, from Coal Harbor, whither the tusks are transported. In some seasons ten tons of these tusks are secured by the Indians, and they are valued at seventy cents (gold) per pound at Sitka. Large quantities of the tusks are obtained in trade and capture by the Arctic whalers, who also try out the oil. The skin of the walrus is used by the Aleutes and by the Esquimaux for constructing their large travelling boats, called baidars, capable of carrying ten tons of freight. At the saw mill on Woody Island, oppsite St. Paul, the Walrus hide is successfully used for heavy machine belting.

The systematic hunting of the walrus, prompted by better prices than have been paid by the barely life-sustaining tariff of the Russian-American Company, will develop this valuable branch of industry. Arctic whalers just from those waters assure us that the number of these animals is incalculable.

Near Point Mulgrave, in the Arctic, Cook found them in great numbers; one weighed eight hundred and fifty-four pounds; and they are generally of the size of an ox. Near Cape Lisburne "the numbers of walrus is almost incredible;" his crew liked the flesh, and called it "marine beef." When Kotzebue was at anchor in eighteen and one-half fathoms, on the north side of East Cape, "thousands of walrus played round the ship, and roared like oxen; and among them appeared several whales."

POPULATION AND GENERAL CHARACTERISTICS OF THE INHABITANTS.

It is not necessary to enter into an elaborate account of the divisions and subdivisions of the Indian races that inhabit the seaboard of Alaska, although we have had translated and gathered much material upon that subject; nor is it expected that any account of the manners and customs of the people will be required.

The annexed official table of the population of Alaska, excluding Esquimaux, Koloshes, and inland tribes, has been obtained through the kindness of Prince Maksutoff, from the archives of the Russian-American Company at Sitka, and includes the Russian half-breeds, (known throughout this territory as Creoles, (the Aleutes, the Aliaskans of Alaska Peninsula, and the natives of Cook's Inlet, or

Kenay Bay, Prince William Sound, and Copper River. The inhabitants of Limusin, Behring and Copper Islands, are embraced by the table; but in arriving at the numbers now subject to the laws of the United States, they and the Russians are excluded from the final enumeration. The total adult and minor population then stands four thousand five hundred and eleven males, and four thousand five hundred and five females.

The Koloshes are inhabitants of the Alexander Archipelago, and extend as far west as Yakutat or Behring Bay, while many of them visit the Atna or Copper River every season for the purposes of trade, and are supposed to number four or five thousand, although Tebenkoff place them at forty thousand! and describes them as a fierce and treacherous race.

Bishop Veniaminoff enumerates all their villages, and sums up their total numbers at five thousand eight hundred from Dixon Sound to Yakutat Bay. Kotzebue says they bear the same relation to the human race that polecats do to other quadrupeds.

The Esquimaux north of Norton Sound and round the Arctic shores are estimated by Beechey to number twenty-five hundred, which estimate is, doubtless, excessive.

Through the courtesy of the officers of the company we are able to further subdivide the numbers given in the table among their respective islands and districts:

On the Island of Attou, one hundred and fifteen male and one hundred and five female Aleutes.

On the Island of Atkha, one hundred and forty-six male and one hundred and fifty-nine female Aleutes.

On the Island of St. Paul, one hundred and forty-seven male and one hundred and thirty-six female Aleutes.

The population of the islands and villages of the Unalaska and Unga districts was kindly furnished us by the priest of Ilioulioulk, and differs slightly from the records at Sitka. It is here given *in extenso*, as indicating to our fishermen and traders where labor can be procured. It is compiled for the year 1867.

	Males.	Females.
On Unalaska Island:		
In the Ilioulioulk settlement	153	156
Makushinski village	23	26
Koshu-ghin-ski village	36	33
Tchernofski village	33	29
Setshekinski village	21	28
Imagwinski village	17	15
Making a total of 570 souls on Unalaska Island.		
On Biorka Island	43	42
Akou	50	49

Population of the islands and valleys of the Unalaska and Unga districts—Continued.

	Males.	Females.
On Avatanok Island	22	23
Fidalga	21	22
Svin-noy	13	9
Umnak	50	51
Making a total population of Unalaska district 965.		
UNGA DISTRICT.		
On Unga Island	80	84
Korovinski	20	12
Ascension	11	15
Unimak	28	29
Peninsula Alaska		
In Pavlofski village	19	21
Belkofski village	65	103
Morjheski village	33	38
Making a total population of the Unga district 558.		
On St. Paul Island	156	150
St. George Island	64	75
Making a total population, under the charge of the priest of Unalaska, of 1,968 souls.		

Upon the islands of Kadiak and Afognak there are of Russians, 50 males; of Creoles, adult males, 209, children, 240; adult females, 216, children, 196; of Aleutes, adult males, 628, children, 326; adult females, 560, children, 324; making a total of 2,499. The Koloshian colony at St. Paul, formed of redeemed slaves of Sitka, is not enumerated; judging from the number of houses they probably number sixty people.

On Alaska Peninsula, opposite Kadiak, there are of Aliaskans, 439 adult males and 311 children; of adult females, 422, and 261 children; making a total of 1,433.

The Indians about the entrance to Cook's Inlet, and round to Copper River, number 223 adult males, and 151 children; 225 adult females, and 113 children.

The Indians in the northern part of Cook's Inlet number 324 adult males, and 167 children; 393 adult females, and 203 children.

The Aleutes are very distinct in their looks, manners, language, and customs from all the other Indians of the Northwest, and many of them bear a close resemblance to the less marked of the Japanese, so much so that the question at once arises whether this people has not been directly derived from castaway or ship-wrecked inhabitants of Japan, carried thither by the Kamtschatka branch of the great Japanese stream; but it is not our province to investigate the problem in this place. They are a quiet, patient people, gifted with a great deal of ingenuity, and always trusted implicitly by the Russians. The priest of the Unalaska

district is an Aleut, and a man of more than ordinary natural ability and taste. The surgeon of the company service at Ilioulíouk, now the Coast Survey tidal observer, is also a full-blooded native, who has acquitted himself creditably in his observations. Many of the block-houses of the Russian Company are constructed by the Aleutes; and the church at Ilioulíouk is a good specimen of their workmanship; even the capitals of the interior wooden columns were carved by them with rude means. They make skillful mechanics, and the principal mechanician and instrument-repairer at Sitka is an Aleut, who early displayed talent, and was sent at the company's expense to St. Petersburg, where he learned the business of an o-p tician. His workmanship exhibits talent that needed a large field to develop. This man's wife, a full-blooded Indian, and their daughter, attended by command the ball given to the United States officers by the Prince and Princess Maksutoff, during our stay at Sitka. The thirty-eight charts of Tebenkoff's atlas were drawn and engraved upon copper by a half-breed Aleut named Kadin.

The bidarkas or skin canoes of the Aleutes, constructed for one, two or three persons, are fine specimens of ingenuity and form; the light frame is constructed of wood, where the article is so scarce that it must be brought from Kadiak or sought for on the beaches. In the management of these canoes they display cool courage and thorough knowledge of their capabilities. In the early days of the first sea-otter hunters, they made coast voyages of a thousand to fifteen hundred miles with them, traveling from Unalaska as far as Sitka Sound. Vancouver found seven hundred of these canoes, with fifteen hundred natives of Unalaska and Kadiak, as far eastward as Behring Bay. Baranoff took six hundred of these canoes and one thousand men to Sitka in 1804. As models they are not excelled by any of those seen on the Pacific coast; and as simple mechanical constructions, they are vastly superior to any southward.

Their large skin boats, baidars, capable of carrying from forty to sixty persons, were used in trading between distant islands as far as St. Paul and St. George, when the Russians first reached the country. They are still in use, and were employed at Ulakhta harbor to coal the steamer.

The Aleutes are very ingenious in their traps for catching the smaller fur-bearing animals, very neat in their spears, walrus barbs, and sinew twine, and apt in adopting the simplest means to obtain their ends. We obtained a specimen of their application of the cam in so trifling an article as a clasp for holding the edge of any fabric which they are sewing. They soon become very handy with the use of ordinary tools, do good blacksmith work, use the lathe, &c.; but, unfortunately, have had few incentives to continued industry and improvement. The great number of officially recognized holidays during the year—eighty-six besides Sundays—has a very bad effect upon their industry, and tends to keep them in close acquaintance with poverty. In fact, the want of incentive for industry is the great drawback to development in general on this coast, and would appear to have been the unexpressed but inevitable policy of the Russian-American Company.

In carving figures from walrus tusks, or the tusks of the fossil mammoth found on Kotzebue Sound the Aleutes display patience, and in many cases considerable ingenuity, constructing out of walrus tusk small figures of hunters, rocks, seal and fish, representing the practice of seal-hunting, making mimic representation of their dancing and musical entertainments, &c., &c.

In hunting the sea-otter and seals they exhibit their tenacity of purpose by watching for days at a time rather than lose the object of their pursuit. They do not use the bow and arrow, but the small ivory-headed spear, thrown with the aid of a hand-board, and their exhibitions of skill proved their expertness and proficiency. Most of the crews of the Russian Company's vessels are composed of Aleutes, but they do not make the hardy sailor that the European or American does.

Another peculiarity we noticed in their favor at Unalaska: whenever a woman was one of two or three persons in a bidarka, she was not compelled to use the paddle, as we have heretofore invariably seen on the Pacific coast.

The women are very ingenious in making a great variety of stitches in their sewing, and those of Unalaska have always been noted for skill in and the beauty of their sewing.

No murder has been committed among the Aleutes for the last fifty-two years, and when the last occurred the whole race was horror-struck.

Of the Koloshes, of the Alexander Archipelago, we have seen comparatively little. They have forty large houses outside the stockade at Sitka, averaging thirty feet front by fifty deep and twenty in height, constructed mostly of boards from two to four feet wide, which they make from the spruce and cedar. Enormous posts and beams form the frame, and they are roofed with boards similar to the sides, but have no chimneys, only an opening in the roof for the exit of smoke. Some of them have pretensions to comfort and cleanliness inside, having well-scrubbed boards laid for a floor, round the center space of six or seven feet square, which is filled in with pebbles and used as the fireplace. Their canoes, hollowed from the trunks of trees, display much less ingenuity and grace than those of the Chinooks of the Columbia river, or the Clallams of the Strait of Fuca and Admiralty Inlet. They have always been a fighting race, attacking the early traders and discoverers whenever they could do so at an advantage. They attacked Vancouver's boats upon several occasions, and in 1798 attacked and destroyed the first settlement of Sitka, a few miles westward of the present location. In 1804 they had a stockaded village and fort at the present site of Sitka, with several four and six-pounders worked by American traders, and sustained an attack from the Neva under Lisiansky. The error in all the past policy of treating with them has been to acknowledge the importance and power of their chiefs, so as to secure their trade in furs from rival traders. This error has been continued to the present day, and upon the slightest opportunity, or for fancied slight, they assume immense airs, swagger with cool insolence, and threaten war. The practice of the Russian-American Company of selling to them certain quan-

tities of rum has transmitted to our government a legacy pregnant with many evils. The policy of trading fire-arms, powder, and ball to them for temporary gain in trade has assisted in degenerating the race and effectually destroyed their natural wealth, the sea-otter.

The problem to be solved is a peculiar one, and it would be out of place to make suggestions as to the best policy to be pursued in treating them, especially as the present military governor, Major General J. C. Davis, combines the requisites for success in managing and controlling them, although his policy must suffer much derangement by the illicit introduction of spirituous liquors, so readily and secretly effected through the hundreds of harbors and channels of this archipelago, especially as the Indians, from a love of rum, assist in warning and hiding the smugglers. Uniform kindness, strict justice, prompt decision, and rigid execution of purpose are the corner-stones of any policy by which they can be humanely governed.

As traders they are shrewd, long in deciding, exacting presents after a bargain is made, and do not hesitate to break any contract. On the Stikine River they caused some annoyance to the early miners, but of late they have not proved troublesome, especially since the death of two prominent hostile chiefs. The Indians from the neighborhood of Kake are the same that sent a canoe-load of fighting men, about the year 1856, all the way from the Clarence Strait to Whidbey Island, in Washington Territory, to behead ex-collector of customs, Ebey, in retaliation for the killing of one of their chief men when the United States steamer Massachusetts opened her batteries on the temporary encampment of Stikine or Kake Indians on the sand point opposite the saw-mills of Port Gamble, where the men were employed as laborers.

Two or three years since some of the sub-tribes, twenty or thirty miles west of the Stikine, captured the English trading schooner Royal Charlie, murdered her crew, and plundered and scuttled the vessel. In May, 1862, between two hundred and fifty and three hundred of the Indians on the west side of Chatham Strait, and about twenty-five miles north of Cross Sound, or Icy Strait, seized the captain and chief trader of the Hudson Bay Company's steamer Labouchère, of seven hundred tons, on the quarter-deck, and taking possession of the vessel drove the crew forward. But parleying took place, and the crew having a large gun trained aft, agreed to fire off their rifles, the Indians afterwards doing the same, and finally leaving the vessel, which at night quietly steamed away and was afraid to return for a year. It is but just to the Indian chiefs to say that when the vessel returned they covered her deck with fine sea-otter and other skins as a present to the captain and trader and a token of peace. One or two other instances of attack upon small traders have been brought to my notice, but enough has been stated to show that these Indians must be treated with firmness.

The commercial rivalry that has existed between the traders of the Russian-American Company and the Hudson Bay Company, which held a trading lease of part of the Russian sea-bound territory, has tended to keep alive and engender

excited feelings on the part of the Indians. Illicit traders, with whisky in their cargo, will heighten all the bad passions of the race. Tebenkoff says the Koloshes are treacherous, proud, and fond of gain, but that the first quality has been gradually controlled since the introduction of steamers in the fur trade, the Indians acknowledging that these vessels can find them out promptly and punish them.

The natives inhabiting the coast between Behring Bay and Prince William Sound are called Ugalensé; they are not numerous, reckoning only about thirteen hundred souls, and living upon fish and the products of the soil and trade.

The Coast Indians on the southwestern part of the Alexander Archipelago are Hydahs, and belong to the nation that occupies the Queen Charlotte Islands. From Portland Canal southward towards Vancouver Island, along the main and the bordering archipelago, the Chimshyán nation holds the country nearly to Millbank Sound, where the Bellbellas commence and continue down Johnstone Strait.

Of the characteristics of the natives of Prince William Sound, Cook's Inlet, and Alaska Peninsula, we have no recent information. They doubtless have changed in many respects since the fur trading has given them means of clothing and luxury to which none of them are averse.

THE COAST OF ALASKA—GENERAL DESCRIPTION.

The Pacific coast of Alaska commences at the southward, in latitude 54° 40′, forming the north shores of Dixon Sound, and sweeps in a long, regular curve to the northward and westward for five hundred and fifty miles, to the vicinity of the entrance of Prince William Sound, and thence seven hundred and twenty-five miles southward and westward to the extremity of Alaska Peninsula, where the line of islands generally known as the Aleutians stretches towards the coast of Kamtschatka in a long curve, with the convexity to the south.

The highest latitude of the great bend of the main coast line north of Sitka is 60½° and longitude 145½° at Controller Bay; and the western and southern point of Alaska Peninsula is in latitude 55° and longitude 163°, where it is separated by the impassable Strait of Isanotsky from the extensive but nearly snow-clad island of Únimak, marked with great volcanic peaks covered with eternal snow.

From Isanotsky Strait the Aleutians sweep in a very regular curve to the southward and westward for seven hundred and fifty miles, reaching the latitude of 51½° in longitude 180°, and thence northward and westward three hundred and twenty-five miles towards Behring Island, in 55° of latitude and 195° of longitude; but Attoú, the western of the Aleutians, and Copper Island, just east of Behring Island, are separated by a strait two hundred miles wide, through the middle of which the boundary line of the treaty passes.

The Aleutian Islands are the summits of the Alaskan range which sweeps along the American coast from the southward and eastward, thence round the

head of Prince William Sound and Cook's Inlet, and down the Alaska Peninsula. The peninsula and islands are marked by forty or fifty volcanoes in activity, and reaching elevations as great as twelve thousand feet on the west shores of Cook's Inlet, eight thousand nine hundred and fifty-three feet on Únimak, five thousand six hundred and ninety-one on Unalaska, four thousand eight hundred and fifty-two on Atka, six thousand nine hundred and seventy-five on Tanaga, three thousand seven hundred on Kryska, and three thousand eighty-four on Attoú.

North of the peninsula of Alaska the coast has a general direction northward to latitude 66° in the Arctic Sea, indented by four large bays or sounds, respectively named Bristol, Kouskoquim, Norton, and Kotzebue; and receiving among others the great river Youkon, having its sources about 130° west longitude in British America.

The extensive sheet of water north of the Aleutians to Behring Strait, in latitude 65½°, and between the American and Asiatic continents, is known as Behring Sea, and, so far as sounded, consists of very extensive submarine levels of remarkable evenness of surface at a very small depth. It is marked by several large islands, upon two of which, St. Paul and St. George, are located Russian factories.

Off the southeastern shore of the Alaska Peninsula lies the large island of Kadiak, which has numerous adjacent islands separated by narrow and navigable straits. North of the Kadiak group, and forming part of the eastern shore of the Alaska Peninsula, is Cook's Inlet, one hundred and fifty-nine miles long and from fifty to twenty miles in width, penetrating the Territory to latitude 61°, longitude 150°, and receiving two large rivers near its head.

The great extent of water lying in the curve of the coast between Dixon Sound and the south part of the Kadiak Group has been named, by the Superintendent of the Coast Survey, the Gulf of Alaska.

From Dixon Sound, in 54° 40′, to the Chilkaht, in 59° 14′, the main land is guarded by a vast archipelago of very large islands, most of them having high mountains throughout, and all covered with a dense growth of large spruce, hemlock, and cedar. The dimensions of this assemblage of islands averages about seventy-five miles east and west, and two hundred and sixty-five miles north-northwest and south-southeast, divided by numerous navigable passages, one of which, named by Vancouver, Chatham Strait, stretches in a straight line one hundred and ninety-five miles nearly north-northwest from Cape Ommaney, in latitude 56° 10′, to the mouth of the Chilkaht, in latitude 59° 14′, with an average width of seven or eight miles, and great depth of water. This great strait has numerous anchorages and small bays, and several large passages connecting it with the other straits to the eastward, and two important ones with the sea to the north of Sitka. Of the latter, one passes through Peril Strait and Salisbury Sound to the Gulf of Alaska, about twenty miles north of Sitka Sound, with a navigable branch to Sitka, and the second through Cross Sound, or Icy Strait, to

the Gulf of Alaska, about seventy-five miles north of Sitka Sound. The north shore of Cross Sound is the southern part of the peninsula of the mainland lying between Chatham Strait and the Gulf of Alaska, and the termination of the great range of coast mountains that embraces Mounts St. Elias, Fairweather, and Crillon.

To the above extensive archipelago, embracing a shore-line of nearly eight thousand statute miles, we have applied the name of "Alexander Archipelago," in honor of the Emperor of Russia.

From Icy Strait the coast is very slightly indented by bays up to the extreme northern part of the Gulf of Alaska, in longitude 142°. Here the extensive area of water, islands, and peninsulas, known as Prince William Sound, stretches inland to the base of the great mountains for sixty miles, with a width of nearly the same distance.

One hundred miles westward of that sound is Cook's Inlet, and the peninsula lying between them is denominated the Kenai Peninsula.

GENERAL APPEARANCE OF THE COAST.

The sea-coast of the Alexander Archipelago is formed of very irregular outline on account of the numerous bays, straits, and islands. The south coast, facing upon Dixon Sound, and extending eighty miles from the mouth of Portland Canal to Cape Kygáni, exhibits headland, shore, and mountains covered with Sitka spruce and yellow cedar to their summits. The mountains attain an elevation of two or three thousand feet, with no valleys for cultivation between them. The same description applies to the coast from Kygáni to Icy Strait.

It is remarkable that outside the sea-coast line of this archipelago but two islands are laid down, both being small, and ten to fifteen miles off the island of Prince of Wales. The same absence of coast islands westward of Icy Strait is remarked as far as the eastern mouth of Copper River, in longitude 144°, being a distance of five hundred miles of coast from Kygáni.

Westward of Icy Strait the coast mountain range attains an elevation of about eight or nine thousand feet, covered in most part with perpetual snow; with some magnificent snow peaks reaching the great height of nearly fifteen thousand feet, and frequently seen at a distance of over one hundred and fifty miles at sea.

The immediate sea-coast west of Letuya Bay or Port Français, thirty-two miles northwestward from Icy Strait Sound, to Prince William Sound, is comparatively low wooded ground, but close backed by icy-faced steeps that come down from the high mountain range, and, as at the head of Behring Bay and Icy Bay, frequently reaching the coast line.

A great part of the immediate shores of Prince William Sound is low, as are most of the projecting arms and some of the islands on the western side. The extreme northwestern arm of this sound stretches through what is laid down on

the map as low ground, to within ten miles of the head of Turn-again arm of Cook's Inlet.

The western shores of Kenai Peninsula are low and well wooded, but rise to bold mountains a few miles back. Although the elevation of this spur or peninsula is less than that of the Mount St. Elias range, yet it is sufficiently great to develop numerous glaciers, which work down to the waters of the sound and to the heads of the bays on the southeast coast. A very large one exists on the lake at the head of the river Kassiloff, debouching into Cook's Inlet about latitude 60° 20′.

The peninsula of Alaska appears to be formed by a continuation of the Mount St. Elias range, broken or deflected at Prince William Sound, and embraces some very high and volcanic peaks. The southeast shores of the peninsula are generally bold and rocky, and as far westward as abreast of the island of Kadiak there is timber on the low margin of the coast, but gradually becoming scarcer to the west of Kadiak, when it ceases altogether. With the narrowing of the peninsula many bays indent its shores on both sides, and numerous lakes, connected by small streams, exist among the mountains. The northwest coast is low and sandy, and backed by a narrow, low belt of land covered with herbage. For the last sixty miles to the westward the peninsula is comparatively low, and nearly divided into islands by deep bays indenting its shores.

The chain of mountainous islands thence westward to the coast of Kamtschatka commences with the high and extensive one called Unimak, having near its eastern extremity the great volcanic peak of Shishaldin, said to have an elevation of nearly nine thousand feet. Further westward the islands diminish in extent and frequency, yet among them are many high volcanic peaks. The climate also changes, judging from the appearance of the snow upon the high range of Unimak in September, when there was no snow on the mountains of Unalaska, except on the peak of Makushin, with its five thousand seven hundred feet of elevation and small glacier. This modification of climate should naturally be expected when the warmer waters and winds of the Pacific can pass fully through the numerous straits. West of Unalaska we should expect a colder climate from the influence of the Behring Sea current flowing south, unless more than counterbalanced by the warmer south winds from the Pacific.

Abreast of the southeast coast of the peninsula of Alaska, for one hundred miles from its extremity, lie numerous large and high islands, extending as far off shore as sixty miles, and reaching the latitude of 54° 39′ in longitude 159°. Some of the Russian navigators inform me that the positions of these islands are poorly determined, as their business rarely called them among them.

Broad off the southeast coast of the peninsula, towards Cook's Inlet, and separated from the peninsula by the Petries or Shélikoff Strait, twenty-five to thirty-five miles wide, lies the large and important island of Kadiak, with Spruce, Afog-

nak, and other islands to the northeastward, and the Trinity Islands off its southwest extremity.

The elevations of the mountains of Kadiak rise probably over three thousand feet, as some were trigonometrically measured that were twenty-four hundred feet high quite near the coast of Chiniak Bay.

This island and its accessories may be really considered a prolongation of the peninsula of Kenai parallel with the peninsula of Alaska and the Shélikoff Strait, a continuation of Cook's Inlet. The north end of Afognak Island is only forty miles from the south end of Kenai Peninsula, with a cluster of high barren islands lying between them.

That extensive banks exist well out to sea, off the south and southeast coast of Alaska, Kadiak, and some of the Aleutians, there can remain no doubt, from the observations of the old navigators and the determinations made upon this expedition. The limit of that off the northeast end of Kadiak, discovered by Portlock in 1786, has been extended; and an important fishing bank, situated off the Akutan and Unimak Straits, heretofore unknown, has been sounded upon, and its position approximately determined, in very thick weather. Soundings obtained thirty miles off the Shumagin Islands indicate a bank in that vicinity. Other banks, frequented by the codfishing vessels from San Francisco and Victoria, exist in the western part of the Gulf of Alaska and among the Shumagin Islands.

Off the south shores of Unimak and Unalaska rocky islets are said to exist and to have been visited by Aleutes in pursuit of sea-otters.

Of the waters adjoining the coast very little is known with accuracy. The currents have been only incidentally determined; the surface and deep-sea temperatures have not been investigated, and the general results are obtained from the practical experience or opinions of navigators, in a region where the opportunities for determining a vessel's position are very limited indeed, on account of the large percentage of thick weather.

From the navigators of the Russian-American Company we have obtained much valuable information, many interesting facts and descriptions, and some manuscript maps and tracings.

In consulting the works of the old navigators many important descriptions of headlands, bays, &c., lie scattered through their volumnious pages; and in the following descriptions all that was not personally observed has been collated from the old navigators, discoverers, and fur-traders, or obtained directly from the Russian navigators, and Tebenkoff's description of his atlas.

Considering the means at their disposal, and the special objects of the Russian-American Company, they have added very much to our stock of general geographical knowledge, and the archives of the company would doubtless reveal much more. In matters of minute detail their surveys are deficient, but their general results are good.

CURRENTS OF THE NORTH PACIFIC.

The North Pacific presents a peculiarly striking analogy to the North Atlantic in the existence of a great warm current, which sweeps along the eastern coast of Asia to the northeastward, crosses the Pacific, washes the northwest coast of America, affects the climate of the whole coast, and gives a much higher temperature along the seaboard than would exist under normal circumstances.

The Japanese have long been well aware of this great current, which washes the southeastern shores of their empire, and have given to it the name Kuro-Siwo, or Black Stream, from its deep blue color when compared with the neighboring waters of the Pacific. It has been noticed by nearly all the old navigators and explorers, and a systematic series of observations was undertaken by the United States expedition to Japan under Commodore Perry.

This singular current, with the water at an average maximum temperature of 86°—being that of equatorial waters—affords a solution to the fact of the Bonin Islands, in the latitude of 27½°, having an exclusively tropical vegetation, the cause of which was long a mystery to naturalists. It also accounts for the productiveness of the southern islands of the Japan group in sugar and other products, usually confined to intertropical regions and to the successful development of the silkworm as high as latitude 45°.

The results of observations, corroborated by the fact of the high temperature above stated, show very satisfactorily that the Japan stream has its origin in the great northern equatorial current.

This great northern equatorial current, leaving the coast of Lower California and the Gulf of California between the latitudes of 15° and 25°, sweeps across the whole Pacific, with its axis two or three degrees south of the Sandwich Islands, and thence continuing on the parallel of 15°, and coming gradually northward until it passes the position of the Ladrone Islands, in latitude 17°, and longitude 214° west, is gradually deflected to the north and northeast, along the Asiatic coast, but apparently with decreased velocity; although Beechey says that, when between the south end of Formosa and the island of Botel Tobago Sima, lying sixty miles eastward, he experienced a current which carried the vessel north 56° west twenty-six miles in the night, or two and a half miles per hour. He does not state the temperature of the water; and several leagues off the Vele Rete rocks, situated off the south end of Formosa, the weather being nearly calm, the vessel was drawn into a very strong current rip, and continued in it several hours, during which no bottom could be found with one hundred fathoms of line. Experiments with a buoy gave a current to the southeast of seven-eighths of a mile per hour, but he doubts the accuracy of the results. The water was much agitated and made considerable noise, and had a vessel seen it or heard it in the night she must have taken it for breakers and put about. On Beechey's voyage from the Sandwich Islands to the Ladrones he kept outside the northern limit of the great equatorial stream, and experienced a counter-current to the eastward of nearly seven miles per day.

At one hundred and twenty leagues eastward of Formosa the monsoon current of the Caroline Islands runs northward and then northeast, to add its waters to those of the great Japan stream.

The combined waters of the Caroline and equatorial streams are thrown against the island of Formosa in latitude 22° and longitude 239° west,* thence deflected to the northward and northeastward, and in the parallel of 31° strike the southern extremity of Japan, and pass close along the northeastern coasts of Niphon. Of the south and east point of Niphon, in latitude 35°, longitude 220° west, the stream begins to spread, and by the time it reaches latitude 38° and longitude 210°, it has been divided or split into two by the intrusion of the cold polar current. The contact of the cold and warm waters gives rise to the constant fogs that exist in this region. One branch of the stream, called the Kamtschatka current, moves to the northeast nearly parallel with the coast of Japan, the Kurile islands, and the coast of Kamtschatka, its axis passing just east of Copper Island, in latitude 55°, longitude 191°, and running directly for Behring Strait. The other and greater branch follows the parallel of 35° eastward, being deflected a degree or two toward the south in longitude 180° by the impinging of the cold Behring Sea current, running southward through the Fox Islands; but in longitude 170° it regains its latitude, and finally reaches the latitude of 45° to 50°, in about longitude 148°, where it appears to again divide. The main body of the stream stretches directly towards the coast of America, is deflected to the southward and eastward, runs down the east coast of Oregon and California, and finally sweeps back into the great northern equatorial current. The existence of this current is well demonstrated by the wrecks of Japanese junks upon the coast of Washington Territory and Oregon. Many years ago, upon the beach south of Point Adams, at the entrance to the Columbia River, there was cast away a Chinese or Japanese junk, with many hands and a cargo of beeswax. The ship was totally lost, but the crew saved. In support of this Indian tradition pieces of this wax, coated with sand and bleached nearly white, are occasionally thrown upon the beach after great storms. Formerly a great deal was found, but now it is rarely met with. In 1851 we saw many pieces of it. In 1833 a Japanese junk was wrecked near Cape Flattery, of which accounts can be found in Belcher's narrative and in that of the United States exploring expedition.

Kotzebue mentions the following remarkable case in his "Voyage of discovery into the South Sea and Behring Straits" in 1815–'18.

"Looking over Adams'† Journal I found the following notice: 'Brig Forester, the 24th March, 1815, at sea near the coast of California, in latitude 32° 45′ north,

* It is a curious fact, hitherto unnoticed, that this latitude is nearly that of the southern extremity of Florida, and 160° different in longitude; so that this current and the Atlantic Gulf Stream commence their great journeys from relative positions that are remarkable.

† At that time Captain Alexander Adams commanded the Sandwich Island brig of war Forester, formerly under command of Captain Piggott when she was under English colors. She had been a French privateer named La Grande Quimbarde, and was captured by the English and sold to London merchants. Adams was then Piggott's second officer.

and longitude 126° 57′ west; (this is three hundred and fifty miles south, 73° west from Point Concepcion.) During a strong wind from west-northwest, and rainy weather, we descried this morning at six o'clock a ship at a small distance, the disorder of whose sails convinced us that it stood in need of assistance. We immediately directed our course to it, and recognized the vessel in distress to be a Japanese, which had lost her mast and rudder. I was sent by the captain on board, and found in the ship only three dying Japanese, the captain and two sailors. I instantly had the unfortunate men carried to our brig, where they were perfectly recovered after four months' careful attendance. We learned from these people that they came from the port of Osaca, in Japan, bound to another commercial town, but had been surprised immediately after their departure by a storm and had lost their mast and rudder. They had been, up to this day, a sport of the waves for seventeen months; and of their crew of five and thirty men only three had survived, who would have died of hunger.' This note is so far remarkable as it proves that the currents in these seas, *i. e.*, north of the tropics, always keep their direction from west to east."

Supposing the junk to have kept on the south side of the axis of the great current, and to have been carried directly down the American coast on the western part of this current, it must have traversed five thousand three hundred miles in five hundred and sixteen days, or a trifle over ten miles per day for that whole period.

Within the last four years a Japanese junk was found in mid-ocean by the bark Aukland, and the crew brought to San Francisco. These wrecks are abundant evidence of the force and direction of this great current, in conjunction with the prevailing summer winds.

Of the northern branch of this great stream, flowing towards Alaska, we will speak hereafter.

The Kamtschatka current, after passing through Behring Strait, inclines towards the coast of America, as is fully proved by the existence of drift-wood along the shores and in the waters of the current, while little or none is found on the Asiatic coast or in the waters adjacent. We have this season conversed with whaling captains who left the Arctic as late as October 12th, and their experience of years confirms the above statement.*

This current passes through the Behring Strait with a velocity ranging from one to three knots per hour. It is hardly probable that it can run with much greater velocity, as the whalers can generally work against it with a head wind.

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*Moreover, the interesting fact may here be stated that there has rarely been such an open season in the Arctic as that just passed. Captain Williams went as far westward as 188°, and had then nothing but open sea before him. Captain Thomas went as far north as 72° 55′. From both we have many facts of importance in regard to the connection of Plover Island with Wrangell Land by a low, flat plain stretching north-northwest and west-southwest from Plover Island. This plain was covered with grass in August and September, 1867. This same season Captain Long coasted the south shores of Wrangell Land, marked by mountains, and a volcano over two thousand four hundred feet elevation.

The ice that sometimes moves southward through the strait is not fairly attributable to a change in the current, but to the fact that the warmer water of the Kamtschatka current striking the American coast permits the ice to form on the shores northwest of East Cape, and even to overlap the cape. A heavy northwest wind arising will break up this point of ice and force it southward against the current. This winter ice cape has been seen thus formed by the Russian navigators.

Among the tangible proofs of the origin and existence of the Kamtschatka current are the following: In September, 1862, a Japanese vessel was wrecked on the island of Attoń. She had been driven off the coast of Japan two or three months before with a crew of twelve men, of which she had lost nine before going ashore, and had thus been drifted eighteen hundred miles in this current, at an average velocity of over twenty miles per day. "Among the floating bodies which the sea drives upon the shores of Copper Island, the true right camphor wood, and another sort of wood, very white, soft, and sweet-scented, are occasionally found." Kotzebue found Asiatic woods among the Aleutes of Unalaska.

But the whole of the waters of the Kamtschatka current do not pass through Behring Strait. Striking against the south shore of the large island of St. Lawrence, part of the waters are deflected to the eastward, southward, and finally westward of south, casting their floating wood on the American coast and the north shores of the Aleutian Islands. Beechey experienced a current to the west, when north of Unimak, equal to three miles per hour, doubtless influenced in part by the tidal current through the straits. Russian navigators assure us that when passing south of the Aleutians, between 175° and 185° of longitude, they encounter a cold current from the northward, bringing with it masses of sea-weed, doubtless torn from the shores of the islands. In the vicinity of the island of St. Lawrence the temperature of this return stream is 47°; north of the Aleutians it is also 47°; near these islands and south of them it is 49°, southeast of them 51°.

Between the Kamtschatka current and the Asiatic coast and islands is a cold polar counter-current, coming from the Behring Sea. It follows the coast of Kamtschatka, the trend of the Kurile Islands, gives rise to the currents flowing west into the south part of the Ochotsk Sea, and strikes the northern and eastern part of the coast of Japan.

A small amount of the water of this current passes into the Japan Sea through the Tsugar Strait, but the greater part keeps along the east coast inside, and probably underrunning the great Japan stream, the northwestern edge of which is strongly marked by a sudden depression in the temperature of the water, amounting to 16° and 20°, while the borders of the stream where it chafes are marked by strong current rips, often resembling heavy breakers on reefs and shoals. This difference of the thermal condition of the waters of these two streams causes harassing prevalence of fogs.

Near the origin of the great Japan current the stream is usually confined

between the islands of Formosa and Majicio-Sima, with a width of one hundred miles, but to the northward of the latter it rapidly expands on its southern limits and reaches the Loo Choo and Bonin groups, attaining a width to the northward of the latter of five hundred miles. Its southern and eastern limit is not distinctly defined, there being a gradual thermal approximation to that of the air and water. The velocity of the stream varies much, and we have no reliable data whatever of its velocity towards the coast of America.* The United States Japan expedition determined its velocity between the south end of Formosa and the straits of Tsugar, a distance of nine hundred miles, at thirty-five to forty miles per day; and upon one occasion, off the Gulf of Yedo, in latitude 34°, its maximum strength was recorded as high as eighty miles per day. In the latitude of 35°, at seventy leagues from the coast, its direction is east-northeast, and its rate forty-eight miles per day; while at twenty-five leagues from the coast in the same latitude it is seventy-two miles per day, corroborating the above maximum velocity. King also assures us that in these latitudes he found it running at the rate of five miles per hour. The rate and direction vary with the season as well as the distance from the coast. In November its course becomes more northerly, and in July more easterly.

The western body of the Behring Sea current from the north strikes this great stream in about latitude 39° and longitude 200° west, and splits it, but being too feeble to overcome it, passes beneath it, and is gradually brought to the surface upon reaching shoaler water; while the Behring current combined with the returning Gulf of Alaska current presses against the northern edge of the great stream from longitude in 165° to 200°, and passes beneath it. We have thermal observations in proof of the existence of a cold sub-stream between Florida and the Bahamas, and we also know clearly the existence of "cold walls" working, as it were, against and through the stream of the Atlantic. The whirls and eddies observed in the middle of the great Japan stream, off the coast of Japan, indicate the existence of a similar cold sub-current; and walls of cold water are indicated by the observations of the United States expedition. Beechey's thermal observations on the southern edge of the great stream, in latitude 35° and longitude 194½° west, corroborate these indications, for he found the temperature of the water at seven hundred and sixty fathoms 28° colder than at the surface; and two days later, when on his course north-northwest to Petropaulski, in the fork between the Kamtschatka and Japan streams, "the temperature at one hundred and eighty fathoms was as cold as at five hundred fathoms in the above position; and also that it was 20° colder at three hundred and eighty fathoms in this position than it was at seven hundred and sixty fathoms in the above." Thus, at three hundred and eighty fathoms he found the temperature 48° colder than the surface water of the great stream, which had already left the coast of Japan

*In the vicinity of Sanak Island and reef, there is a current (September 15, 1865,) of a knot and a half an hour to the north and east. Surface temperature 56°.—W. H. DALL.

twelve hundred miles. Of course, under such thermal conditions, Beechey found himself enveloped in dense and continuous fogs and drizzling rains all the way to Petropaulski, with the exception of one day in latitude 50°.

On the southern edge of the great stream, almost identically in the position of Beechey, Kotzebue was remarkably influenced by the cold current which had underrun the warm stream and risen to the surface. In latitude 34° 3′, longitude 194° 8′, a violent current carried the ship, on the 1st of April 1817, thirty-six miles south 20° west; and on the 2d, thirty-six and three-quarter miles south 18° east. This current was accompanied with a high sea from the south, and the temperature of the air fell from 83°.8 to 54°.5, and to us very cold. On the 3d of April, in latitude 34° 27′, longitude 193° 47′, the current set the vessel south 81° west thirty-four miles. There was a faint wind, and he noticed the water ripple on the surface of the sea, caused by the currents. In this position the temperature of the air was 60°; of the surface water 58°.5, and at a depth of two hundred and fifty fathoms 48°.5. On the 5th of April, in latitude 35° 35′, longitude 191° 49′, by good observations, the current had carried the vessel in two days fifty-two and three-quarters miles south 34° west.

In the first positions Beechey and Kotzebue were fourteen hundred miles east of the Japan coast, and ten hundred and fifty miles broad off the Kurile Islands.

While there is no doubt whatever that the greater body of water of the great Japan stream flows to the eastward after dividing off the coast of Japan, the fact is also evident from the decreased velocity of the Kamtschatka current off the coast of that peninsula, where Tessan found it, in the latitude of Petropaulski, running at a rate of only seven to ten miles per day in an east-northeast and northeast direction. The observations upon the western limit of the cold Behring Sea current indicate, also, the contracted width of this current. On the contrary, the eastern and main branch has, in the longitude of 165° west, a maximum breadth of 20° of latitude from 22° to 43°. On the southern limit the temperature is 78°, or four degrees above that of the great equatorial current returning from the California coast; and its northern limit of 64°, or 11° to 13° greater than the variable currents to the northward.

The passages of the China and San Francisco steamers will, in time, afford us means of determining many peculiarities of this current.

In the vicinity of the great northern curve of this current, about longitude 150° and latitude 44°, all navigators have found drift-wood, seal, sea-otter, land-birds, and many indications of land. We have collected many notices of this character, and will submit them to you in a separate report. Between this great bend and the Sandwich Islands lies what is called Flieurens whirlpool or eddy.

Neither the great stream nor any part of it is laid down as passing as far north as latitude 50°, and hence is not supposed to pass into the Gulf of Alaska; but while the great body of the stream sweeps round and follows the direction of the western coast of America to the Gulf of California, a branch continues direct towards the Alexander Archipelago, and, striking the southern

part of that coast, is deflected to the northward and westward, and follows the trend of the coast round the Gulf of Alaska to the westward, and, finally, to the southwestward. It is this warm Alaska branch which causes the high isothermal line that exists directly upon this coast. The current to the northward, westward and southwestward, along the coast of the Gulf of Alaska, is well known to navigators, and is generally conceded to have a velocity of ten to twenty miles per day. One of the Russian navigators informs us that he has found it running at least thirty-six miles per day. Upon our trip from Sitka to the Pamplona rocks, on a straight course, we found but little current in our favor, but between the Shumagin Islands and the Sannak Island and reef it was very strong to the southward along the coast. If the position of the reef is correctly laid down, we experienced a current of not less than four or five knots per hour, between eight o'clock a. m. and half-past twelve p. m., on the 4th of September 1867. Others have experienced the same velocity, which is, doubtless, in great part due to tidal currents passing through the straits into the Behring Sea.

Off the east shore of the Kadiak group, on the Portlock bank, we experienced a set towards the southwest, parallel to the coast of Kadiak. Tebenkoff lays down a current in the same direction. It is this returning current which adds its weight to the current from the Behring Sea to press against the northern edge of the great stream, and to underrun it.

An exploration of the region of the ocean where the divide takes place may develop causes for the division of the great stream and the deflection of each part.

There is doubtless an eddy between the southern edge of this Alaska branch when sweeping westward and the northern edge of the main stream running eastward; for Lisiansky, on his voyage from Kadiak to Sitka, in June, 1805, which he made in six days, to within a few miles of Mount Edgecumbe, with fair winds, had an "easterly current which had pushed him forward during the last five days, and still flowed in the same direction."

We have been thus extended in our investigations upon this great Japanese stream and its branches that its effects upon the climate of Alaska may be properly understood, and also its effect upon the question of the great circle route from San Francisco to China.

GREAT CIRCLE ROUTE FROM SAN FRANCISCO TO JAPAN.

These currents, their effects upon the weather, and the prevailing westerly winds, will, in the absence of the strongest advantages, decide the question against the great circle route from San Francisco to Yokohama, or even to Hakodadi.

The local and very variable currents about the Aleutians, the thick weather, and the supposed existence of islands south of the chain, combine to render an approach to them extremely hazardous; but, with fine weather, no coast affords better marked outlines and landmarks.

A vessel making the great circle track to the eastward would have the great

Japan stream in her favor to about latitude 43°, longitude 204° west, or about one thousand four hundred and forty miles; then the cold Behring Sea current and the end of the Alaska current to latitude 47° and longitude 157° west, or one thousand nine hundred and eighty miles; finally to San Francisco, about one thousand eight hundred and sixty miles, passing through the great bend of the Japan stream where so many indications of land have been recorded, and where the weather is almost invariably thick and bad in summer, and cold and boisterous in winter. On this track the summer winds would generally be favorable, and, with good weather, it would be altogether the desirable route, but, with thick, foggy weather for nearly the whole of this distance, undetermined velocity and direction of the currents except in general terms, great variability of climate to passengers and cargo, and extra hazard and risk to life and ship, some great and positive advantage over all these must exist to warrant the adoption of it. The westward trip would have heavy, adverse winds nearly the whole distance; large sea and adverse currents for two-thirds the distance. In such a case a few days extra bad weather would consume the vessel's coal, and run the supply short just when in the axis of the main stream.

The greatest inducement for adopting the great circle under such circumstances would be the discovery of deposits of good coal among the Aleutian Islands, or within a reasonable distance of the harbor nearest the great circle route.

The commercial advantages of the steam route to China through the warmer and more equable latitudes, must always outweigh any merely theoretical and shorter but more hazardous route. A study of the currents, winds, and weather on the lower latitude route, will lead to the conclusion that is being solved practically. From the south end of Japan to San Francisco, a course very little north of a direct line on a Mercator projection, carries a vessel across the great Japan stream, in part through the axis of the main branch flowing eastward across the northern part of the so-called Flieurens whirlpool, and across the California stream, with favorable or light winds the greater part of the distance. In returning, the course should be southward of the direct course, taking advantage of the California stream and favorable northwest winds, and entering the upper limit of the waters moving westward to the longitude of the Sandwich Islands, to form part of the great northern equatorial current, thence westward, through variable and feeble currents, until the upper limits of the western part of the equatorial current are entered. The other advantages of this route are fine weather and an equable and warm temperature. This line is already competing for the passenger travel and highest class freight between France and England and China, *via* San Francisco, and it is an important consideration with the company that the passengers shall not have to undergo a rapid transition from the heat of the tropics to the penetrating fogs of the North Pacific.

Should good coal be developed near Sitka, a depot for the company could be readily established on some of the islands near the present route of the ships,

and supplied from Alaska. By taking advantage of the ocean currents and the prevailing northwest winds, much quicker time could be made by the coal ships than the distance would lead us to suppose.

Of the smaller and local currents in the Behring Sea and among the Aleutians, it is hardly necessary to enter into detail, as mention of them will be made when describing the features of the coast.

THE GREAT ARCHIPELAGO.

From the head of Puget Sound, in latitude 47° 03′, to the mouth of the Chilkaht, in 59° 15′, through seven hundred and thirty-two miles of latitude, lies the vast interior line of navigation unequalled in the world for bold shores, deep waters, numerous bays and harbors, bordered every mile with timber of great size and height. The smallest craft can make their trading trips through these waters without the risk of a sea voyage; small steamboats can traverse them and find fuel at every point of the twenty thousand miles of shore-line. The frequency of passages connecting these great straits and sounds with the ocean, renders them of inestimable value as means of refuge to vessels fearing or suffering from heavy weather at sea. Each year's examination develops their availability and teaches us the characteristic marks by which they are known.

The great ocean bulwarks of this labyrinth of waters are the mountainous islands of Vancouver, Queen Charlotte, Prince of Wales, Baranoff, and Chichagoff.

These waters were discovered by the American vessel Washington, that entered by the Strait of Fuca, in 48° 24′, and left them by Dixon Sound, 54° 40′.

Meares examined many of the connecting passages, and has not only left us the outline record of his work, but his appreciation of their importance by characterizing them as the *Great Archipelago.*

Of this great net-work of passages, about one-half the extent in latitude is part of British Columbia—while the southern and northern parts belong to the United States. The southern part, between 47° 03′ and 49°, has been described in the California Coast Pilot, and the passages along the coast of British Columbia have been described in general terms.

The northern part of this great archipelago has been named the Alexander Archipelago, and will be described in its regular order.

DETAILED DESCRIPTION OF CAPES, BAYS, HARBORS, ISLANDS, ETC.

It would be almost impossible, within reasonable limits, to give a detailed description of the great number of known harbors and anchorages, rocks, islands, and points, that abound in the Alexander Archipelago. Indeed so numerous are they that many of them are yet unexplored or known only in general characteristics to the trader. From Icy Strait and the mouth of the Chilkaht to the head of Puget Sound, this great labyrinth of waters stands unequaled in the world

for safe and bold inland navigation. The scherries of Finland and the fiords of Norway sink into insignificance before the great dimensions of these straits and sounds. By their exploration and description, Vancouver is entitled to indisputable celebrity. A number of harbors have been partially examined and preliminarily surveyed by the old navigators and by the officers of the Russian-American Company. Many of these have been published in detached form in books and maps, and charts of travel, but no attempt was made to arrange them in any sort of order until Tebenkoff undertook to aggregate the labors of Vancouver, La Pérouse, Kotzebue, Beechey, and others, with the numerous Russian explorations, in an atlas of thirty-eight charts published in 1848. His descriptive memoir does not fill the requirements of a directory of the coast, but is more occupied with the names of the officers who made certain explorations. Many of these tentative examinations were made in their searches for new fields of traffic, for winter harbors for the whalers of the company, and also to instruct the mates in such duties, and to familiarize them with the different parts of the coast.

By very numerous voyages and systematic reports, combined with comparatively recent English and French explorations, the Russian-American Company has improved the general geographical positions of prominent points and harbors along the whole coast and on the line of the Aleutians, although a vast amount of general, and especially of detailed labor, is yet to be accomplished. In fact there is not even a small map of any part of the coast, or of any harbor, which can be counted as worth more than a reconnoissance or preliminary survey. The shortness of the working season and its uncertainty, combined with the paramount object of the fur trade, accounts for the lack of geographical knowledge of this coast, and in consideration of these drawbacks the company deserves great credit for the amount of geographical work its officers have accomplished.

THE ISLANDS OF THE ARCHIPELAGO ALEXANDER.

It is only necessary to locate and enumerate the principal ones of the eleven hundred* islands and islets laid down in this archipelago. The great islands flanking the ocean are Prince of Wales and its closely adjacent islands and islets. The island has a general direction north 28° west; stretches from Cape Chacon in latitude 54° 42′, to Point Baker, in 56° 22′; having an extreme length of one hundred and seven miles and an average width of forty miles. Its north and east shores are bordered by Clarence Sound; its southern by Dixon Sound; on the west lie the islands and straits forming Bucarelli Sound; between it and the

* Prince of Wales Island and those closely surrounding it, one hundred and thirty-five; from Portland Canal to Cape Caamano, one hundred and thirty-four; from Cape Caamano to middle of Stikine Strait, seventy-seven; between Chatham, Frederick, and Stikine Straits, three hundred and fifty; Admiralty Island and those around it, one hundred and eighteen; Baranoff and adjacent islands, one hundred and thirty-eight; Chatham Strait north of Admiralty Island, twenty-nine; Chichagoff and adjacent islands to Fairweather Peninsula, one hundred and nine.

mainland lie the Gravina Islands and Revilla Gigedo, Zarembo, Etolin, Wrangell, &c. These islands are all high, much broken, and covered with great forests.

The southeastern part of Baranoff Island lies off the northwest part of Prince of Wales Island, with part of Kuiou Island and Chatham and Clarence Straits intervening. Baranoff Island has a general direction north 17° west; stretches from Cape Ommaney, in latitude 56° 10′, to Peril Strait, in 57° 32′; having a length of eighty-seven miles and an average width of twenty-two miles. Its north shore is washed by Peril Strait, and the east shore by Chatham Strait. Between its southern part and the mainland, near the Stikine River, lie the islands of Coronation, Kuiou, Kuprianoff, Mitikoff, &c. To the east of its northern part lies the southern part of Admiralty Island. Off its northwestern part lies the large island of Pitt, or Kruzoff, forming part of the shores of Sitka Sound. Baranoff is high, broken, and densely covered with timber. Upon Kuiou and Kuprianoff Islands bituminous coal veins have been opened. These coal deposits and those of Admiralty Island have the same general trend as the islands and main straits of the archipelago Alexander.

Pitt or Kruzoff Island lies north and south between Cape Edgecumbe, in latitude 57°, and the north extremity in Salisbury Sound, in latitude 57° 18′. Its length is nineteen miles, and its greatest width through Mount Edgecumbe is about eight miles. It is moderately high, broken, and densely wooded.

North of Baranoff Island, and separated therefrom by Peril Strait, lies the island of Chichagoff. Its general direction is the same as Baranoff; its length fifty-seven miles, and average width thirty-six miles. It has not been explored since Vancouver's time. On the north it is separated from the Fairweather Peninsula by Icy Strait; its eastern shore is washed by Chatham Strait, and the north part of Admiralty Island lies east of it.

Admiralty Island has a general direction with Chatham Strait north by east; stretches from Point Gardner, in latitude 57° 01′, to Point Retreat, in latitude 58° 18′; has a length of eighty-three miles, and an average width of about twenty-five miles. Its shores have been described in the description of Chatham Strait. In Krouznoff Bay, on this island, has been opened a bituminous coal mine.

DIXON SOUND.

This sheet of water, opening upon the Pacific Ocean, lies between the north side of the Queen Charlotte group and the south capes and shores of the Alexander Archipelago, between the latitudes of 54° 10′ and 54° 35′, and longitudes 131° and 133½°. From the northern part lead several great straits and sounds; from the northeastern part, which was named Buccleugh Sound by Meares in 1789, leads the channel to Portland Canal, the southern dividing line between British Columbia and Alaska.

Dixon Sound opens southward upon extensive waters leading among the islands. It is comparatively free from dangers, having, however, a few rocks on

the north side that are reported to be not well laid down. It is named on some maps Granitza Sound, and on others Ky-gah-ne Strait. It was named by Dixon.* Meares in the same year named it Douglas Entrance, after the commander of the Iphigenia, one of his vessels.

Before describing the headlands, bays, &c., of the North Sound, the following remarks upon the north shores of the Queen Charlotte group, forming the south shores of the western part of Dixon Sound, are given from the best available authorities.

ROSE POINT.

This peculiar point forms the northeast part of the Queen Charlotte group, on the south shores of Dixon Sound, and stretches well into its waters. The higher part of the point has the appearance of an island when seen from the east or west, but is connected to the main island by a low, narrow neck of wooded land. The northern extremity of this high peninsula is in 54° 12′, longitude 131° 24′; but northward of it stretches a low, sandy reef to latitude 54° 20′. On the west side of the peninsula there is the appearance of a good roadstead, sheltered from all southerly and east winds.

When abreast the north point of the peninsula, Douglas "got sight of both sides as well as of a sandy spit, level with the water, which ran to the northward as far as the eye could see from the mast-head." "After rounding the sandy level" and stretching along the eastern side of it, "they came to regular soundings of ten, eight, and seven fathoms of water, about three or four miles from the island, the extremes of which bore north by west, and southeast by east half east, by compass. He named it Rose Point, and placed it in latitude 54° 18′.

PORTLAND CANAL.

This extensive arm of Dixon Sound forms the southeastern dividing line between British Columbia and Alaska; it commences in latitude 54° 41′, according to Vancouver's map, and the entrance lies between Point Maskelyne,† on the mainland near Port Simpson, and Point Wales,‡ upon an island lying northwest from Point Maskelyne. Vancouver places the latter in latitude 54° 42½′, longitude 150° 15′ west, (Vol. I, p. 327,) while the position of Point Wales from the map is in 54° 41½′, and longitude 150° 20′. "The entrance is not more than two and a half miles across, and this, at the distance of a few miles, seemed to be materially contracted." From the entrance the canal runs north 35° east twenty miles, with an average width of three miles, with channels breaking off to the east and west, where it receives Observatory Inlet, a large branch which comes about forty miles from the north-northeast. The north point, dividing Observatory Inlet from the canal, was named by Vancouver, Point Ramsden, and placed in latitude

* In 1775 it was discovered by Bodega, and named by him Perez Inlet.—W. H. D.
† Named by Vancouver in 1793.
‡ Named by Vancouver in 1793, after his instructor, Mr. Wales of Christ's Hospital.

54° 59′, and longitude 149° 57½′ west, (page 336.) At first, when entering upon the survey of the canal and inlet, Vancouver was "uncertain which to consider the main branch." (Vol. II, p. 330.)

The canal continues from the above point with the course north 23° west for seven miles; then north 30° east for thirteen miles; north 20° west for thirteen miles; north 7° degrees west for ten miles; north 27° east for nine miles, and terminates in latitude 55° 45′, and longitude 149° 54′. (Vol. II. p. 340.)

The distance on the above courses, taken from Vancouver's map, sum up seventy-two miles, and in his narrative he says the total "distance from its entrance to its mouth is about seventy miles; which, in honor of the noble family of Bentinck, I named *Portland's Canal.*" (Vol. II, p. 371.)

"The shores of this inlet were nearly straight, and in general little more than a mile asunder, composed mostly of high, rocky cliffs, covered with pine trees to a considerable height; but the more interior country was a compact body of high, barren mountains, covered with snow, (July 29, 1793.) As we pursued this branch, salmon in great plenty were leaping in all directions; seals and sea-otter were also seen in great numbers, even where the water was nearly fresh, and which was the case for upwards of twenty miles from its termination." (Vol. II, p. 340.)

On the Admiralty Chart No. 1923 A, the name of the point designated by Vancouver as Maskelyne, has been transferred to another lying two and one-fourth miles inside the entrance of the canal and surrounded by islands.

Vancouver says that off Point Maskelyne lie two rocky islets, and to the south of it a small island close to the shore; doubtless Birnie Island.

On this chart, the Point Maskelyne of Vancouver, is placed in latitude 54° 36′.9, longitude 130° 27′.7, and Point Wales lies northwest one mile. This will place the entrance about latitude 54° 37½′ north, and longitude 130° 28½′ west.

TAYAKHONSITI HARBOR.

The first anchorage in the southeast part of Alaska is this contracted harbor,* situated about ten miles northwest of Port Simpson, in the narrow straits forming a group of islands about five or six miles west-northwest from Point Wales. Its only importance was the large village of about one hundred and forty-five souls of the Tongas tribe, and since 1867 the establishment of a United States military post named Fort Tongas.

Two small straits intersect each other in the group of islands, and form four passages: one leading northeast from the intersection through numerous islets and islands to Portland Canal; one to the northwest; the principal one leading westward towards Dixon Sound; and the fourth and narrowest one southeast. This latter passage is three miles long, and in the narrowest part, near the inter-

* Sometimes written Hekhonsiti, Hechopcity, and even Crescent City and Clement City. The name adopted is from the Russian manuscript sketch.

section, is less than the eighth of a mile wide, with only two fathoms of water. There is anchorage laid down at its southern entrance in twenty-four fathoms, over gravel bottom: about two miles in it lie three small islets in mid-channel; the passage is on the west side of these islets, in five fathoms, and just beyond is anchorage in twenty fathoms, mud: close under the northeast point of the passage, at the intersection, there is anchorage in 16 fathoms, mud.

The principal passage leading in from the westward is half a mile in width, with the shores bordered by rocks. The mid-channel course gives soundings in five or six fathoms in the entrance, increasing to seven and eight when the village on the south shore bears about south. A reef of rocks is laid down in front of the village. The passages intersect about a mile and a quarter from the west entrance, with seventeen to twenty fathoms of water. The northeast and northwest passages are represented as about half a mile in width.

The latest information says no good harbor is found here except for very small vessels; that the "harbor, in and about it, needs a careful survey, being in rather a bad situation, surrounded by rocks, reefs, and shoals on the outside and inside." On account of the United States military post here it was visited by three large vessels in 1868. In clearing the timber for this post it is reported that yellow cedar trees of eight feet diameter were cut down.

Chichagoff places the entrance of the west passage in latitude 54° 47′ north and longitude 130° 32′ west and the entrance of the southeast passage in 54° 44′ north and longitude 130° 29′.5 west.

The entrance to the west passage lies about four miles east of Cape Fox on the latest charts.

STRAITS, BAYS, AND CAPES ON DIXON SOUND.

From the north side of Dixon Sound open Revilla Gigedo* Channel or the Tongas Narrows, between Cape Fox and Cape Northumberland, leading to Behm Channel and Clarence Strait; Clarence Strait, between Cape Northumberland and Cape Chacon; and Cordova Bay, between Cape Chacon and Cape Kygane or Muzon, with the Tlevak Strait, leading to Bucarelli Sound. The foregoing capes are nearly on the same parallel of latitude and comprised within two degrees of longitude.

CAPE FOX.†

This broad point lies in the eastern part of Dixon Sound, where it is only six miles in width, with the north point of the Dundas Islands directly south. The south part of the cape is not less than five miles in extent east and west, bordered by rocks and islets and backed by high wooded ridges. Near the southwestern part of the cape Vancouver took refuge with his boats "in a commodious, well-sheltered little cove, which protected them from a very hard gale of wind from the

* Named by Vancouver after the Conde de Revilla Gigedo, viceroy of New Spain.
† Named by Vancouver.

southeast, which brought from the ocean so heavy a sea upon these shores as to invade even our snug retreat." He placed the southeasternmost part of the cape, which is formed by an islet, in latitude 54° 45½′, but he had rainy weather and apparently no observations. Three miles westward from the southwest part of the cape a sunken rock is laid down on the charts, with the tracks of the trading steamers on either side. This is the Cape Muorey of Meares, who placed it in latitude 54° 43′, and says that a small rocky island lies off it.

TONGAS NARROWS AND THE GRAVINA ISLANDS.

The south entrance to the Tongas Narrows opens upon Dixon Sound between Capes Fox and Northumberland, and runs in a general north-northwest direction forty-five miles to the latitude 55° 27½′, where the northwest opening of Behm* Channel meets Clarence Strait. At the south the width is four or five miles, but in a few miles it is much reduced in width by numerous small islands and islets; at the north its width is a little over a mile. Throughout its length several anchorages are laid down on Tebenkoff's chart, with the track of the trading steamers through the strait.

A very pretty but small basin is found on the east side of the northern entrance, about two or three miles inside the northern point. It has a small wooded islet in its entrance, and anchorage is found in twelve to fifteen fathoms over muddy bottom. This anchorage is resorted to by the Hudson Bay Company, and we anchored in it in 1867.

The Tilhnach settlement of Indians is located near the northeastern point, which was named Point Higgins by Vancouver. The northwestern point is Vallenar,† "a very remarkable projecting point, off which two small wooded islets stretch over a mile to the north-northwest; from Point Higgins these islets bear south 40° west half a league distant."

The Gravina group of islands forms the western shores of the Narrows. It consists of three large and numerous small ones, whose eastern shores have never been outlined. Two large channels pass through them, east and west, from Tongas Narrows to Clarence Sound.

CAPE NORTHUMBERLAND.‡

This is the southeastern point of the entrance to Clarence Sound and lies between it and the Tongas Narrows. It is the extremity of the group of islands called the Gravina group; is low, close to the water, but rises to high ridges of a thousand or fifteen hundred feet, wooded from the water's edge to the summits. When coming out of the Tongas Narrows a low wooded islet is seen lying off the cape. It lies thirteen miles north 60° west from Cape Fox, and twenty-four miles north 67° east from Cape Chacon.

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* Named by Vancouver after Major Behm at Kamtschatka.

† Named by Vancouver in 1793, after his excellency Señor Higgins de Vallenar, the president of Chili.

‡ Named by Vancouver in 1793 "in honor of that illustrious family."

Vancouver observed the latitude of Cape Northumberland on a small island of a large number lying south of the cape. From this island, which he describes as tolerably high, he gained a very distinct view of the surrounding rocks and breakers in all directions. His position was in latitude 54° 51½′ north. He says the outermost of the rocky islets towards the northwest lies north 57° west, three and a half miles distant; those to the southwest, south 67° west, four and a half miles distant; the southernmost, which was furthest off, south six miles distant; and the southeasternmost, south 50° east, distant five miles. Halfway between the southeastern and southwestern islets, and in line with them lies another cluster. In Vol. II, p. 380, he describes them as follows:

"The southernmost of the rocks lying off Cape Northumberland is a round lump of barren rock, very small, always above water, and which has some breakers lying at a little distance off its southeast side. The southeasternmost of these rocks lies from the south rock north 43° east, distant four and a half miles, and is a low, flat, double rock, always above water, but has much broken ground in the neighborhood. The southwesternmost rocks are two small rocks above water, with much broken ground to the north and northeast of them and in a direct line to the southeasternmost rocks. They bear from the south rock north 44° west, distant five and a half miles. Between these and the eastern shore lie many dangerous rocks and breakers; but no dangers appeared northward of the south rock, between it and the other rocks, where the channel to all appearance appeared to be free from impediments."

He places the southernmost rock in latitude 54° 44′, seven and a half miles south of the cape.

Tebenkoff places the rock in latitude 54° 46½′, longitude 131° 13′, and five miles south of the cape, with the track of the Russian vessels on either side.

The English Admiralty Chart No. 2431, places them in accordance with Vancouver's description.

We have named this southernmost rock the "Barren Rock;" it lies about twelve miles west of Cape Fox.

In June 1789, Meares named the "high mountain" of Cape Northumberland Mount St. Lazaro, and placed it in latitude 54° 52′. With his glass he perceived the appearance of a village upon the cape. Vancouver says that from his latitude station he saw at the northeast part of the cape, on a high detached rock, the remains of a village.

Seven and a half miles south 50° west, Admiralty Chart No. 2431 lays down the Devil's Ridge, but the position doubtful; and twelve miles south 72° west, a rock and cluster about it marked doubtful. Both are broad off the south entrance to Clarence Strait. Tebenkoff has only one patch of rock called the Devil's Bank, lying fifteen miles south 57° west from Barren Rock, and twelve miles south 72° east from Cape Chacon. It is marked as a rock above water, with sunken rocks around it.

CLARENCE SOUND.

From the north side of Dixon Sound, between Capes Northumberland and Chacon, in longitude 131½°, Clarence Sound opens with a width of fifteen to twenty miles; runs in a general northwest by north direction for one hundred and twenty miles; thence westward twenty miles; and finally south-southeast for twenty-five miles, with the large islands called Coronation and Warren at its western entrance, where it mingles its waters with those at the entrance to Chatham Strait. The average width of the whole sound is about seven miles, but at some places its available channel is much reduced by islets and rocks. In a measure it surrounds the island called Prince of Wales, the southern point of which is the initial point of the boundary line between Alaska and British Columbia. Numerous straits are reported to exist through parts of this large island, dividing it into an extensive group, and is hence sometimes called Prince of Wales Archipelago. From the eastern side of Clarence Straits great arms penetrate in a general direction to the northeastward until they reach the base of the coast mountains; these arms or inlets are known as the Behm Canal, a large one not named, Ernest Sound, Stikine Sound, Wrangell Straits, &c. Their waters are navigable, the shores generally very bold and covered with timber, and the whole forming an intricacy of inland navigation difficult to describe in detail, and best studied on the chart. The southwestern and parts of the eastern shores of Prince of Wales Archipelago have remained unexplored since the examinations of the Spaniards, who left little more than numerous names to prominent capes, points, unexplored bays and straits.

Clarence Sound forms part of that vast and unparalleled system of deep inland navigation extending from latitude 47° 03′ to 59° 15′.

PORT GARDNER.

The first bay and anchorage in the entrance to Clarence Sound is Port Gardner, on the western side, and eight miles north-northeast of the southeastern extremity (Cape Chacon) of Prince of Wales Island. The entrance is in latitude 54° 49′, longitude 131° 45′, and on Tebenkoff's atlas is laid down about a mile wide and two miles deep, expanding into an ample basin inside the mouth, which has an islet and rock in it. The course to enter this bay is marked on another Russian chart as on the north side of the islet. No depth of water or details are given.

In June, 1789, Meares anchored in a small anchorage with a depth of twenty-three fathoms over sand and shells, the latitude being 54° 51′. He called it Port Meares.

Another bay and anchorage is indicated as a stopping place for trading vessels about two miles further northward, along the same shore, and is designated on a Russian chart as "The Archipelago," as a great number of islets are laid down in it. The track indicates the passage to lie north of the islets.

CHICHAGOFF BAY.

In latitude 55° 01′ there is marked another small bay and anchorage on the south side of the southeast point of the entrance to Moira sound. No name is given to this anchorage, but the large bay filled with islands just to the southward is called Chichagoff by the Russians.

TONGAS BAY.

This large bay is on the eastern side of the sound, on the middle one of the three large islands forming the Gravina group lying between Tongas Narrows and Clarence Sound. There are two entrances to this harbor, separated by a large wooded island, or rather by a group of five or six smaller islands. Both are in latitude 54° 59′, and the islands separating them are in longitude 131° 23′, and have an extent of two miles each way. Point Davison* is the southwest point of the Gravina Island stretching farthest into Clarence Sound and forms part of the shore to the western entrance. There is an extensive reef off this point, stretching southwestward about a mile and a half. The eastern point, being the south point of the island in the entrance, is named Point Percy,† and the passage between these points is two miles wide and runs about northeast for four miles, contracts to a mile in width, when it runs north one mile, northwest two miles, where it suddenly contracts to a very narrow passage to the west for half a mile, and expands to a large basin two miles long, north and south, and one and a half wide, east and west, with ten to fifteen fathoms of water in it. Where the channel is first contracted to one mile in width the soundings range from thirty to twenty fathoms, with anchorages of fifteen to twenty fathoms in several places. The bottom throughout is represented as muddy. There are several small islets in the channel, but they have deep water close to them.

Vancouver states the latitude of Point Davison to be 55° 00½′, The position of the inner anchorage, according to Etolin, is in latitude 55° 03′ north and longitude 131° 25′ west.

Rough plans are given of this bay by Tebenkoff and in other Russian charts from that of Etolin made in 1833. The rise and fall of tide is stated at fourteen feet.

MOIRA SOUND.

The entrance to this sound, on the west side of Clarence Sound, lies in about latitude 55° 02′, is about two miles in width, and has several islets off each point. It penetrates Wales Island about six miles to the southwest, then turns sharply to the northwest for six or eight miles, heading near the heads of Cholmondely Sound, which comes from north-northeast, and Tliakak Bay, which comes from the southwest from Cordova Bay.

"The land in the neighborhood of Moira Sound is high and rather steep

* Named by Vancouver in 1793 after Alexander Davison, the owner of the storeship of his expedition.

† Named by Vancouver in 1793.

towards Clarence Sound; but north of Wedge Island, (in latitude 55° 07′,) the straight and compact shores are moderately elevated, and the interior country is composed of lofty though uneven mountains, producing an almost impenetrable forest of pine trees from the water side nearly to their summits, but by no means so high as we had been accustomed to see in the more inland country." (Vancouver ii, p. 381.)

Wedge Island "from many points of view resembled a wedge; from its south point stretches a ledge of dangerous rocks on which the sea broke with great violence."

CHOLMONDELEY SOUND.*

On the western shore of Clarence Sound, about latitude 55° 17′, Cape Tchaseni runs two miles directly west to the eastern side of the entrance to Cholmondeley Sound, one or two miles wide, and in it lie several islets, with a larger one, named Skin Island lying north 75° west two and a half miles from the east point of Cape Tchaseni.† A Russian chart has a small islet close on the north side of the eastern part of the cape. The anchorage of the trading vessels is laid down broad off the north side of the cape. This sound runs south-southwest for ten or twelve miles and opens into several unexplored arms. The head of the main body of water lies near the heads of Moira Sound and of Tliakak Bay, which opens into the northeast part of the unexplored bay of Cordova. On the inside of the entrance to the sound and on the eastern side lies the native settlement of Chasintzeff.

KAZARN BAY.

Forty-two miles north of Cape Chacon, on the west side of Clarence Sound, an anchorage is laid down at the entrance of Kazarn Bay, the opening to which lies in latitude 55° 27′, longitude 132° 01′, one and a half mile inside the point eastward of it. A large island named Grindall lies two miles northeast of this point, while a broad unexplored arm of the sound runs westward of Kazarn. The bay is four miles long, about one mile wide, runs about south-southwest, and has a settlement at its head.

A Russian has established a trading post and salmon fishery in this bay, and in July 1868 was curing and packing two hundred barrels a week, and could have trebled it but for want of facilities; the salmon run from July 1 to end of August. The harbor is reported good and easy of access; spruce and yellow cedar attain great size and cover the shores which Tebenkoff represents as moderately low.

A second bay lies just west of Kazarn, and is represented as unexplored. The great arm running to the westward is said to bend to the northwest, and finally to bend to the north, opening again upon Clarence Sound in latitude 55° 40′, where the Russian chart has an anchorage, and another five miles to the southeast.

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* Named by Vancouver 1793.

† Called Point Charm on Admiralty Map No. 2431.

CAPE CAAMANO.

About latitude 55° 29′ Clarence Sound receives the Tongas Narrows from the southeast, and the west part of Behm Canal from the north-northeast.

The point lying between the west shore of Behm Canal and the east shore of Clarence Sound was named Cape Caamano by Vancouver, but its position was not determined by observation. It is wooded to the water, and close around it are rocks. From it Point Higgins lies east by south half south, about four miles distant, and Grindall Island south 58° west, about four miles. From Cape Chacon it is about forty-six miles distant.

PORT STEWART.*

Twelve miles north of Cape Caamano, on the western shore of the north arm of Behm Canal, which opens into the east side of Clarence Sound, in latitude 55° 30′, at the head of Tongas Narrows, lies Port Stewart, off which the islet three-eighths of a mile northwest of the south point lies in latitude 55° 38′ 15″, longitude 131° 45′. From the south point the north point bears north by west one and a half miles.

The general direction of the bay is northwest, and the depth two miles; but the upper part of the bay, receiving a small stream, is nearly filled by a flat at its western part, leaving a small bay in the north part land-locked, with from six to nine fathoms of water and one-quarter of a mile in extent; this has a narrow channel with seven fathoms close to the north shore, and rocks and shoal ground to the south of the channel.

The islets on the south shore are nearly connected by shoals only visible at low water; but good entrance may be had in fifteen to twenty fathoms to the northward, and between them and a row of three smaller islets one-quarter of a mile off the northern shore. One-quarter of a mile south of the north point is a rocky patch with deep water all around.

On the same side of the Behm Canal, six miles north of Port Stewart, lies the opening to an extensive bay running four miles west-northwest, with islets and rocks in the entrance, and an extensive settlement noted at the head on Tebenkoff's chart. This bay has no name on the charts.

Directly east of Port Stewart lies the Traitor Cove of Vancouver, near which his boats were attacked by the Indians.

The southeastern point of the entrance of Ernest Sound into Clarence Sound is called Point Mesurier, and is situated in latitude 55° 46′, according to Vancouver, with a rock lying over a mile west-northwest from its extremity. This point is five miles long by one or two wide, and stretches well into Clarence Sound; from its extremity the north shore runs east four miles to the entrance of a small bay not yet named, and running to the southeast two miles. It is one of the anchorages of the Russian steamers.

* Named by Vancouver in 1793.

The low wooded point called Tonkoi, on the western side of Clarence Sound, and seven miles west-northwest from Point Mesurier, has an anchorage on the north side, about one mile inside the point. The depth of water is not marked, but Tebenkoff places anchorage off the north shore of the point. This point lies abreast of the mass of islands forming the southern point of York Island, (Duke of York, Vancouver,) and Clarence Sound is here contracted to a width of four miles.

From Tonkoi Point the shore runs northwest by west for six miles to the narrow opening of a large basin named Ratstch Bay, which Tebenkoff marks as an anchorage. It has a small islet in the entrance.

Thence northward for fifteen miles the western shore is compact, and the eastern much broken to Point Stanhope,* where Johnstone observed the latitude, 56° 02′. The south face of this point extends two miles east to the half-mile wide entrance of a long bay stretching seven or eight miles northward. Off the west side of Point Stanhope are some small rocky islets and rocks.

Five or six miles northward of Point Stanhope Vancouver anchored in seven fathoms water on the north side of a small island, close under the shore. This situation is tolerably well sheltered from the southerly and southwest winds, but the soundings are irregular and the bottom in some places rocky.

The islands between Ernest and Clarence Straits were called Duke of York Islands by Vancouver, but on the Russian and recent admiralty charts they are called *Etolin Islands.*

In latitude 56° 15′, the large arm called *Stikine Strait* makes into Clarence Sound from the northeast. This strait leads to the mouth of the Stikine River by two arms of which the larger or more direct is twenty-two miles long by three or four wide. *Steamer Bay* lies at the southeast point of the entrance; no soundings are given, and a manuscript Russian chart shows the anchorage one mile inside the entrance in a cove on the west shore. Just inside the entrance to the strait lie two islands on the south shore, and anchorage is marked on the south side of the eastern and larger island, between it and the shore. Five miles within the entrance, on the eastern shore, is the opening of *Quiet Bay,* stretching one mile to the south, but no soundings are given.

ETOLIN HARBOR.

There is no station immediately at the mouth of Stikine River, but on the northwest part of Wrangell Island, (Katchkhanna on Tebenkoff,) about two and a half miles south of the northern point of the island, is the small harbor of Etolin, in latitude 56° 31′ 30″, and longitude 132° 23′ 30″, where the Russians formerly had a stockaded factory, called Saint Dionisia. The harbor is very contracted, only five hundred yards wide, opens to the northwest and runs to the southeast for about six hundred yards, but has good soundings, regularly decreasing from ten fathoms at the entrance, to three and a half well inside the bay, abreast of the

* Named by Vancouver in 1793.

small island, with muddy bottom from the entrance nearly to the head. A plan of this is given in the Russian chart No. 10 of the Pacific Ocean series. The United States military post Fort Wrangell is established here.

The United States steamer Saginaw places this post in latitude 56° 27′ 20″ and 3° 04′ 30″ east of Sitka, or 132° 13′ 15″ west. But this differs from the nearly concordant positions of Tebenkoff and the "Devastation" in 1862.

POINT HIGHFIELD.

This is the northern extremity of Etolin Island, off which lies a small partially wooded islet two-thirds of a mile distant: between this islet and the point we anchored in sixteen fathoms, muddy bottom, but found disagreeable counter and sub-currents running. A sketch of this anchorage is given on the Admiralty Chart No. 2431, where the position of the islet named Limonoff is stated as latitude 56° 33′, longitude 132° 22′.

From this islet the mouth of the Stikine River, fronted by very extensive sand flats, lies nearly north about eight miles distant.

STIKINE RIVER.

About three miles north-northeast (approximately) lies a small islet, one mile off Green Point, and about half a mile east of the opening of the river at the south edge of the flats. Under this islet soundings are laid down in ten fathoms. The general course of the river through the flats is northward for five or six miles to the east point of an island two miles long north and south; from this island it bends due east two miles to the north shore of Point Rothsay. These extensive flats extend westward from the main land for six miles to the numerous islands four miles northwest of Point Highfield and to the large island of *Mitgoff*, and thus blocks the broad passage from the north shores of Stikine Sound to the southeast part of Frederick Sound,* except for boats at high water, when they pass close along the southeastern shore.

A branch of the Stikine opens into the southeast part of Frederick Sound, about latitude 56° 48′, but it has not been explored.

GENERAL DESCRIPTION OF THE STIKINE RIVER.

The Stikine is the largest river of the southern part of Alaska. As affording the best means of reaching the interior, for the gold along its course, and its being the prospective route of the telegraph to Sitka, it is judged advisable to collate all the information readily accessible.

In 1834 an expedition was fitted out at Fort Vancouver, on the Columbia, by the Hudson's Bay Company, to establish a trading post on this river, but the Russians established a block-house at the mouth, and sent a corvette to prevent this aggressive policy being carried out.

The headwaters of the river had been explored by miners from California and

* Prince Frederick's Sound of Vancouver, 1793.

British Columbia who followed the gold-bearing zone from Frazer River to the northward.

In 1863, a Russian expedition under Commander Bassarguine, of the corvette Rynda, explored the river about sixty-three miles from its mouth, and four miles above the Little Cañon.

In 1865–'67 the Russian American telegraph company explored the interior, and this river for about one hundred and twenty miles to the Bald Hills, where it is said to make its great bend to the southward.

This river, sometimes erroneously confounded with the Frances River of the interior, is usually represented as running nearly east and west, and correctly as heading far to the southward of its mouth. It rises by two branches, one to the northeast and one to the southeast, and from their junction near the latitude of 57° 30′ it flows almost south 30′, then west and southwest, with a general antagonism to the Coast ranges near the archipelago Alexander.

The interior of the country appears to be broken into a succession of sharply-defined mountain ranges separated by narrow and deep valleys, similar to those between the islands of the coast. In fact, the topography of the Alexander Archipelago is a type of that in the interior. A submergence of the mountain region of the mainland would give a similar succession of islands separated by deep and narrow fiords.

It appears from the testimony of miners who have penetrated far into the interior in search of gold, that there is a broad plain stretching northwest and southeast, which separates the mountainous zone of the coast from a lofty range, called by them the "Blue Mountains." This is at the headwaters of the *Stikine* and of other streams that cut through the narrow strip of our recently acquired territory, and it is probably the main dividing range or prolongation of the Rocky mountains.*

The Stikine rises in the Great Plain on the western flank of the Blue Mountains, the North Fork near Lake Ketchum, one of the sources of the Tahco River, and the South Fork near the headwaters of the Skena River. It runs and breaks through the mountains a little south of the parallel of Sitka.

When the snows are melting the river becomes much swollen, and is then navigable, with some difficulty, by small steamboats for one hundred and twenty-five miles or more above the mouth. The valley is generally narrow, and is not bordered by a great breadth of alluvial land, except near the first great bend or turn of the river, where it breaks through the mountains of the coast. At this point there is a broad valley extending far to the southeast, along which Indians can travel to Fort Simpson in six days.

The sides of the mountain ranges are steep and rugged, and are covered, where there is sufficient earth, with a dense forest of coniferous trees, the timber

* Since the above statement from Professor Blake's report was printed, information has been obtained from the late W. U. Tel. Co. expedition that the headwaters of the Stikine River have their rise much farther to southward and eastward.

of which is thought to be superior to that on the coast for spars and other purposes. The upper portions of the high ranges and peaks are covered with snow, and are truly Alpine in their character.

The narrow strips of bottom land on the sides of the river, and the islands between the different channels and sloughs, are almost all low, and seem to be liable to occasional inundations. The soil of such lands is loose and sandy, but fertile, and supports a vigorous growth of alders and the cottonwood, or an allied species of poplar. This poplar is abundant and attains a large size, often three feet in diameter. The wood is soft and light, is easily wrought, and is especially well adapted for the interior portions of cabinet furniture. The Indians use this wood for their canoes, cutting them out of a single log. Immense numbers of these trees are carried down by the stream, and are lodged in heaps on the sandbars and islands, or are left as snags in the channel, anchored by the roots and pointing down stream, as in the Mississippi. The broad flats at the mouth of the river are also strewn with these trees, and many are doubtless carried far out into the sound.

CURRENT AND NAVIGATION OF THE STIKINE.

The velocity and strength of the current throughout the whole length of this river, except perhaps the portion above the Great Cañon, is, perhaps, its most remarkable feature. Plenty of bars and riffles over which the current sweeps down with great uniformity, and in most places is so swift and strong that it is useless to attempt to make headway against it with oars, and when the bed or banks are not suitable for towing or tracking, the only way to force a boat up is by means of poles, taking advantage always of the least forcible parts of the stream. The line for towing a boat should be from two hundred to three hundred feet long. The velocity of the current was measured at several places, and in the portions of the river below the Little Cañon probably averages five miles per hour, and in the lower portion, or for about thirty miles above the mouth, about four miles per hour.

The depth of the water is of course variable, but even at low water is seldom less than three feet in the main channel. The highest water, or season of the greatest floods, is in the month of July, when the snow is melting on the mountains most rapidly under the summer sun. At these times the height of the river, judging by the appearance of the banks, does not appear to be very greatly increased, probably not more than six feet; but the water spreads out over the low banks and islands, and the stream is thus greatly changed in its appearance and in the form and direction of its banks. The water is always charged with a very fine light-colored powder or sediment, so that it is opaque and the bottom of the stream is not visible. This suspended material is probably derived from the glaciers, or may perhaps be washed down from soft stratified formations along the sources of the stream.

Gold can be found in small quantities by panning the drift of the bed and

bars of the river. The "color" is almost invariably found, but in particles so minute as to be difficult to see and more difficult to save. This, of course, is to be expected in trials of the sand and gravel from the surface. It is what is termed "flour gold," and to collect it would require blankets, quicksilver, and greater care and attention than is generally given in the rapid methods of California. There was not time to make any excavations to the bed-rock, where, doubtless, the coarse gold lies. Very good results can, however, be obtained in the layers of gravel above it, and the miners informed me that they seldom attempted to reach the bed-rock, it was so far below the surface. Some of the best results of their mining were obtained in a layer of gravel about eighteen inches below the surface. This eighteen inches of gravel is skimmed off and thrown aside, and the next five or six inches of gravel below is washed in cradles or rockers. The principal mining at Fiddler's and at Carpenter's bars, in 1862, was of this description. One claim of two hundred feet square, worked by two men, yielded $2,000; and the bars are reckoned to yield from $3 to $10 a day to the hand. Nearly all the bars will yield from $1 to $1 50 per day. In 1867 the miners reported on the yield to be from $2 to $7 per day. The extent of paying ground is much increased at the river falls, and doubtless the bed of the river is extremely rich. Unfortunately the time of lowest water is during the winter months, when all is locked in ice, and, of course, washing is then impossible.

The gold from the north fork of the river is the coarsest which has yet been found or reported upon the Stikine, (1862–'63.) One lump was worth $9 75. Even on this stream the bed-rock has not been seen except at one or two places, and it was believed that to reach and work the gravel upon it, derricks, pumps, and other machinery would be necessary. The miners say that this north fork is subject to extensive landslides along its course, which bring masses of earth and rocks into the stream and obstruct it until the force of accumulated water above sweeps everything clean before it.

The officers of the Russian expedition were impressed in ascending this river by the absence of any well-defined terraces or old deposits of drift along the mountain sides or on the low ridges. No terrace was seen until near the Little Cañon, where they are well defined and extend for a mile or two on either one side of the river or the other, and they are also found above the cañon. They rise some fifty feet above the stream, and are made up of coarse, heavy drift. If at such places the bed-rock could be reached above the level of the river, there is little doubt that they would pay well for working. No favorable hill or dry diggings have yet been found above. An explanation of their absence may be found in the fact that the valley is so narrow and the current so strong that all drift accumulations are swept away.

The gold which has been brought by the Indians from the Tahco River further north is coarser than that found upon the Stikine.

CLIMATE OF THE STIKINE.

At the time of the Russian expedition—the last part of the month of May—the poplars and other deciduous trees were just budding, and in some places the young leaves had spread out. The nights, though cold, were not frosty; the thermometer seldom indicating less than forty degrees. It was quite hot in the sun during the day, though in the shade the mercury seldom rose above sixty-five degrees. It is much hotter in midsummer. At Sitka, in the same latitude, or a little north, there is not as great a difference between the summer and winter as upon the Stikine. The winter at Sitka is not severe, and in 1862 there was not a crop of ice. On the Stikine, and in that interior valley, shut out from the influence of the warm ocean current, the seasons are strongly marked. The winters are cold and the summers are hot. The river is reported to close in December, freezes over from its mouth up, and reopens in May. In the winter of 1862–'63 it was open as late as December 17, and in the spring the ice broke up about the 1st of May, and the previous year on the 9th of May. As soon as the warm days of spring cause the snows to melt the river begins to rise, and so breaks up the ice. There is then a short season of rising and falling, after which come the continuous floods of the hot months. Very little rain falls during the summer in the upper part of the valley. Little or nothing was known in 1863 of the climate of the mountain region at the head of the Stikine. At the mining camps at and near Shek's Bar the winter is said to be very severe. Snow commences to fall in October, but is most abundant in December, and covers the ground to a depth of from four to fourteen feet or more all winter. In 1862 four feet of snow on a level fell in one day. In December the mercury sank below zero, and in February was solid in the bulb for nine days continuously. There was no thawing or rain during the winter.

It is perhaps this alternation of the seasons that causes the timber of the interior to be superior (according to report) to that of the coast.

FISH AND GAME.

Salmon, halibut, and other good fish abound at the mouth of the Stikine. When the salmon ascend the river in June and July the Indians follow and catch them in great numbers. They split them along the back, remove the backbone, cut them in long strips, and dry and smoke them. When well cured they are very fine, and are very convenient in camp. Ducks and geese may be shot on the river, and grouse in the forests of the shores. Bears are plenty in the mountains, and the mountain sheep or goat in the rocky places. Beaver and otters are taken in great numbers by the Indians of the valley and its tributaries.

The well-manned boat of the Russian expedition was two hours and a half in passing the cañon. The sides are formed of precipitous cliffs of granite roughly broken out, and the water rushes between them with great force, boiling and whirling as at Hell Gate near New York, when the tide is flowing rapidly. On

the north side, for a part of the way, there is an eddy setting up stream, of which advantage can be taken in passing through.

The approach to this cañon from the southward is marked by a fine conical mountain upon the east side of the river, visible for a great distance, and marking the position of the lower end of the gorge through which the river has broken its way. It has been named the "Cone Mountain." Some of the ridges which extend from it project upon the river and are composed of granite.

About forty miles below this cañon the river turns westward, and breaks through the Coast Mountains for nearly twenty miles to the mouth. The total length of the river is estimated at about three hundred miles, and up to the Little Cañon the sketch of the Russian expedition shows it to average less than a quarter of a mile in width.

The river is also remarkable for the glaciers which are encountered on its right bank, no less than four being found between the mouth and Little Cañon. The first is a small one about ten miles up the river, and has retreated from the shore a mile or two westward between the mountains. It has a high inclination, and a very rugged and broken surface. At the mouth of the Icewater River, flowing from it, is a point of land formed of coarse river-drift, containing gold. Up to this point, the mountains on the south shore, or left bank, come nearly to the water's edge. They are apparently from 1,500 to 3,000 feet high, and are heavily timbered with fir and spruce.

The second glacier is about twenty-five miles from the mouth of the river. It faces the east, presents a splendid appearance in the sunlight, and extends for about two miles along the stream. The background is formed by beautiful snow-covered peaks, from between which the glacier issues, but its source cannot be seen. The slope of the glacier is very gentle, and the vast body of ice appears to be unbroken until it reaches the valley of the river, where it breaks down in massive ledges and pinnacles of the purest crystal. The foreground along the stream consists of an ancient moraine, now covered with trees, among which willows and poplars are conspicuous in their delicate green foliage of spring. Some very large blocks of granite standing in the river bear witness to the vast transporting power of ice and to a much greater extension of this glacier in former periods.

From this part of the river a line of high, rugged, and serrated peaks is visible on the right or eastern side of the valley, and at a considerable distance from the stream.

The accumulations at the foot of the glacier have evidently pushed the river outward, and they have acted as a dam to the waters, which, above the moraine, are quite deep and flow smoothly.

On the opposite side of the river a small clear stream of water enters. It comes from hot springs a short distance up.

Two or three miles below this glacier, a broad valley opens upon the left bank of the river, and apparently extends far to the southeast.

The third glacier is about seven miles above the preceding. In this distance

the river is very crooked, the valley is narrower, large poplar trees are abundant along the banks, and many that have been uprooted by the undermining action of the stream are stranded upon the sand-bars and along the shores.

This is a very beautiful glacier, flowing from a valley on the west. It is remarkable for its symmetry, regular slope, thickness of the ice, and for the contrast with the dense forest on each side of it, and with the belt of deciduous trees upon the bottom-land in front. In the extreme background there is a magnificent angular peak shrouded with snow.

The drift, pebbles, and rocks of the river-bed at this point, and a short distance above, consist chiefly of limestone, porphyry, and jasper, with some masses of quartz.

The fourth glacier is about forty-six miles from the mouth.

The time occupied by the Russian party in descending the river about sixty-three miles was seventeen and a half hours, while ascending the same distance had required eight days of hard exertion.

STIKINE SOUND.

The broad sheet of water leading westward from the Stikine River to the northeast bend of Clarence Sound is named *Stikine Sound* by Tebenkoff. It is four miles wide and about twenty miles in length, with a large number of islands near its eastern end, and lying directly off the flats of the Stikine River.

Several anchorages are found in this sound. Ten fathoms is laid down on the east side of the southeast point of the large island, lying about three miles northwest by west from Point Highfield. On the northwest side of Vauk's Island, two or three miles in extent, and lying five miles west of Point Highfield, anchorage is noted, but no depth marked. South of Vauk's Island lie two islets off the mouth of Bath Harbor, lying eight miles west by south half south from Point Highfield. At the northwest point of Zarembo Island is a number of islets, and on the east side of them there is anchorage in eighteen fathoms.

WRANGELL STRAIT.

It would serve no practical purpose to endeavor to describe the intricacy of islands and sounds south of Frederick Sound and east of Chatham Strait. The maps that are already published are good guides for all general purposes. There is only one available channel between Clarence and Frederick Sounds east of Coronation Island, and that is Wrangell Strait, opening from the northwestern part of Stikine Sound, in latitude 56° 35′ and longitude 132° 48′. It bears north-northeast, distant four miles from the east end of the large island lying in the middle of the west entrance of Stikine Sound. It is tortuous, very narrow, has low wooded shores, broad beaches, and a mid-channel depth of not less than four or five fathoms. A sketch of this, on a large scale, is given on sheet No. 106 of the Russian charts of the Pacific Ocean series. This sketch is not very accurate, but it can be used, especially at low water, when a few rocks not laid down upon it show them-

selves. The United States steamer Saginaw and other government steamers have used it. Three miles west of Wrangell Strait is the entrance to Duncan Channel, running twenty-three miles north and north-northwest.

From the north end of Wrangell Strait is visible the first great glacier that we have seen upon the shores of these waters, although two are reported even south of Port Simpson, on the arms penetrating the continent in that vicinity. This glacier is on the north side of the eastern part of Frederick Sound; and from two islands, about three miles northwest of Wrangell Strait, it bore north by west distant ten or fifteen miles, as well as we could judge through the mist and rain. Rain clouds completely enveloped the tops of the mountains between which it flowed. It was seen over a low point on the north and east side of the sound, and apparently opened upon the shore in the bay east of Point Vandeput, about latitude 57° 06′, longitude 132° 54′. In this vicinity one of the early California ice-ships filled with glacier ice in the winter of 1853–54.

Anchorage is laid down on the west side of Point Vandeput, but no depth is marked.

At the northeast bend of Clarence Sound, between Stikine Strait and Stikine Sound, the channel is mainly occupied by large islands, and the usual and safest course is to the eastward of them and close under the southwest shore of Zarembo Island. At the northern part of this group the channel is less than a mile in width. This group has been surveyed in detail by the Russian company, and is well reduced on Admiralty Chart No. 2431.

In the northernmost part of Clarence Sound, where it is from five to ten miles wide, and twenty-three miles east and west, there are two bays on the south shores.

RED BAY.

The opening to this bay, resorted to by the trading vessels, is situated at the northeast point of Prince of Wales Archipelago. It is represented as five miles long north and south, and from a half to a mile wide. No depth is given, and the anchorage is marked at the entrance. Four miles north of Red Bay, near the middle of the sound, is a rock, which is covered at high water. Around it are soundings from twelve to forty-four fathoms over a rocky bottom.

Port Protection, sixteen miles west of Red Bay, and at the northwest bend of Clarence Sound, is described in another place.

CAPE CHACON.*

Returning to Dixon Sound, and following its northern shores and the Pacific coast northward to the great straits, we first notice this cape, of which we can find no description. In June, 1789, Meares placed Cape Irving in latitude 54° 49′, and described it as a "high bluff," probably this cape. We passed close to it in thick weather and subsequently saw it at a distance. It forms the southwest point of

*Named by Caamans.

the southern entrance of Clarence Sound, is wooded to the water, and backed by high wooded mountains to the northward.

Tebenkoff places it in latitude 54° 42½′ and longitude 131° 54′, evidently following the Russian chart No. 10, of the Pacific series published in 1848. It lies in the same parallel as Capes Kygáne and Nunez and Point Wales.

Two miles southwest of it lies a shoal or reef, and twelve miles south 70° east the Devil's Bank, with one rocky islet and other dangers around.

CAPE NUNEZ.

Six miles west of Cape Chacon lies this point, while between the two a deep broad bay makes six miles to the northward, and has two large islands at the western side. A mile west of the cape lies a rocky islet with rocks between it and the shore. This cape is the eastern point of the opening of Cordova Bay, and is placed by Tebenkoff in latitude 54° 42′, longitude 132° 05′.

CORDOVA BAY.

Between Cape Nunez and Cape Kygáne, eighteen miles westward, is an extensive unexplored bay called Cordova, extending northward into the Prince of Wales Island about fifteen miles and filled with wooded islands, bare islets, and rocks. From the northwestern part of this bay an unexplored strait named Ileoak is said to lead to the southeasternmost arm of the extensive waters called Bucarelli Bay or Sound.

CAPE KYGÁNE.

This is the extreme southwestern point of the Territory of Alaska. Tebenkoff gives a very indistinct view of it at a distance of twenty miles, when bearing north 45° east. On the 11th of August, 1867, we saw the cape within the distance of a mile, but covered with rain clouds very low down. A view of it as it then appeared is given. No description of this important headland has been discovered among the old or recent navigators. The immediate shores were comparatively low and rocky, but covered with heavy spruce to the edge of the bluffs; the outline of the shores to the northwest appeared much broken, and of similar formation to the point. The water around the cape appeared bold, but showed strong current markings inside our position, which was about one mile distant.

Tebenkoff places it in latitude 54° 42′, longitude 132° 39′, but our observations made near it gives the longitude 132° 43′.8. La Pérouse placed it in latitude 54° 46′, but he did not approach it within twelve miles. He says that from Forrester Island eastward towards Cape Kygáne, and across the North Cape of the Queen Charlotte group, he found no bottom with one hundred and twenty fathoms, even a league from shore; but his course is laid down southward and westward of Cape Kygáne.

Between Cape Kygáne and North Cape, forming the northwest point of the Queen Charlotte group, lies the entrance of Dixon Sound. From Cape Kygáne the North Cape bears south 39° west, distant twenty-eight miles.

In this entrance, La Pérouse says that during the night he crossed currents more rapid than he had ever met in the open sea, and no bottom with one hundred and twenty fathoms of line. Douglass crossed the sound from Cape Kygáne towards the eastern part of Queen Charlotte Islands, and when lying to in the hazy night had soundings in sixty to eighty fathoms over a sandy bottom.

KYGÁNE HARBOR.

On the east side of Cape Kygáne, and about two and a half miles northward of its extremity, after passing a great number of islets close along shore, three harbors open to the eastward upon Cordova Bay, and two and a half miles west of the southern point of the first large island (unnamed) in the bay. The soundings in the approaches to the harbors are about forty fathoms. The southern harbor is about three-eighths of a mile wide, runs west-northwest for one and a half mile, and has a large islet inside and towards the southern shore. Up to this islet the soundings are not less than thirty fathoms, and thence gradually decrease towards the head.

The second entrance, less than half a mile north of the southern one, is the opening into two arms of one bay, divided by a long narrow island lying west-northwest. The southern arm is that used as an anchorage, is one mile deep and less than a quarter of a mile wide, with soundings of six fathoms at the entrance, increasing to sixteen fathoms, and then diminishing to eight at the head, where there is quite a snug boat cove on the south side, and a narrow passage to the northern arm on the north side.

The northern arm or harbor has almost the same dimensions as the other, with deeper water at the entrance, (twenty-eight fathoms,) and a basin with six to eight fathoms at the head.

The anchorage in the middle harbor or southern arm of the two northern harbors is placed in latitude 54° 46′, and longitude 132° 45′ 30″, according to the sketch of Etolin, given on the Russian Chart No. 10 of the Pacific series published in 1848. It is also in Tebenkoff, who gives 54° 42′ and 130° 39′ as the position, in the sketch, but on the general chart it is placed in 54° 47′. The former position was determined by Kruzoff in 1824.

The rise and fall of the tide is stated to be sixteen feet. About five miles north of the islet off the southeast point of Kygáne harbor and along the same shore lies *American Bay*, with a large islet off its southeast point, and a smaller islet under its northeast point, with anchorage in eighteen fathoms to the southwestward of this islet. Two or three smaller bays and islets are passed along the intermediate shore, opposite American Bay; the strait is about three-quarters of a mile wide.

BAZAN BAY.

The west shore of Cape Kygáne is indented by many small bays open to the ocean swell. In latitude 54° 48′, eleven miles west-northwest of the cape, is the entrance to the large bay of Bazan, divided into two by the large island called

Dolgoi or Long Island, about half a mile wide, and four or five long east and west.

The bay is three miles wide at the entrance, and stretches eight miles east-northeast, and at its head is filled by a large number of small islands. Between the south shore and Long Island the width of the bay is about one mile, and from the southwestern point of the entrance, called Point Bazan, runs east-northeast for five miles, having soundings of twenty fathoms in the entrance, with ten to fourteen until the east end of the island approaches a point from the southern shore, when a depth of eight fathoms is found in the passage half a mile wide. The anchorage is to the east of this point of the main, with bottom in fifteen fathoms. The Russian navigators inform us that in southwest gales a heavy swell rolls into this bay, which is exposed directly to the ocean, yet the sketch would indicate that perfectly safe anchorage is to be had in the position indicated.

Tebenkoff places Cape Bazan in latitude 54° 48′, and longitude 132° 54′, and states the rise and fall of tide at fourteen feet. He gives a rough sketch of it in chart No. 9 of his atlas.

FORRESTER ISLAND.*

The south end of this island lies in latitude 54° 48′, longitude 133° 29′, distant thirty miles west, 12° north from Cape Kygáne, sixteen miles broad off the coast, and twenty miles south of Cape Bartolomo. Tebenkoff lays it down as a high island, five miles long by one and a half mile wide, with rocks off the south end, and rocks and an islet off the north end. We passed it in the night of the 11th of August in thick rainy weather, and got a very indistinct glimpse of it. The following description is from Meares, August 13 1788:

"Douglas Island is a small island about two miles in circumference, and there are two or three small, low, and rocky islands lying off its north and south ends. It is very high, and covered with verdure, and may be seen at the distance of sixteen or seventeen leagues. It lies ten leagues from the main land, in the latitude of 54° 58′, and longitude 133° 17′."

Dixon does not refer to it in his narrative, but named it Forrester Island in his view and in his map, where he locates it in latitude 55°, and longitude 133° 42′. In the sketch, where it is represented as a high island with several rounded hills, he places it in latitude 55° 12′, and longitude 133° 42′.

Vancouver simply calls it a small high island. Tebenkoff gives a poor view of it at the distance of twenty-five miles.

Maurelle in 1775 named it San Carlos Island, and La Pérouse says he saw them at a distance of three leagues; the largest lies southeast and northwest and may be two leagues in circumference. He determined the latitude of the south point to be 54° 48′, and to the north of this island, three miles long, he has laid down two other islets reaching to 54° 58′. His shores hence to the northward are very erroneous. See notes on Wolf Rock.

* Named by Dixon in 1787, after his steward.

WOLF ROCK.

In latitude 55° 01′, longitude 133° 24′, Tebenkoff lays down a small islet and rocks nine miles north 17° east from the north end of Forrester Island.

Meares says, August 1788:

"Between Forrester Island and the main (to the northward) there is another of lesser extent, which is rocky, barren, and almost level with the water. Between these two islands we steered a course east-southeast by compass, but could get no soundings with fifty fathoms of line."

Vancouver describes it thus:

"From Cape Bartolomo, in latitude 55° 12½′, south 21° east, distance fourteen miles, and twelve miles from the nearest shore, lies a very low, flat, rocky islet, surrounded by rocks and breakers, that extend some distance from it."

From its isolated position he considers it "one of the most dangerous impediments to navigation that he had met with on the exterior coast, and hence it obtained the name of the Wolf Rock."

La Pérouse says:

"A long chain unites Forrester Island to some other islets, (the Wolf Rock,) very small and low, which extend a considerable way into the channel, (*i. e.*, northeastward.) But there are no known obstructions between the Wolf Rock and Forrester Island; we passed between them at night in August, 1867; the track of the Russian trading vessels is between them; Meares got no bottom with fifty fathoms between them."

It was called the Isla Rasa, or Low Island, by the Spaniards.

PORT MEARES.

The meagre description of this bay by Douglas, in 1788, hardly enables us to recognize the bay by the charts. The south point of entrance is about twenty miles northwest half west from Cape Kygane, and fourteen miles east half north from the north end of Forrester Island. On Tebenkoff's chart the two points of entrance lie nearly three miles apart, and north and south of each other. The bay lies about northeast, and is about a mile and a half wide, with two islets inside, about a mile apart northeast and southwest of each other, and in mid-channel; but in another Russian chart they are placed near the northern shore. The bay stretches into the land and then branches into two arms, one leading to the northeast and the other a little east of north.

This agrees with the description of Douglas, but nobody could possibly make anything out of his sketch. In his narrative he says they discerned the opening to the bay when east of Forrester Island, and when up to it they "got within a small island that lies a quarter of a mile from the main land," and drifting down on the island, which was under their lee, the ship was towed by canvas higher up the bay, when they "dropped anchor in twenty-three fathoms, with a bottom of sand and shells." In this position the vessel is landlocked about a mile from the

western shore, except being exposed to four points between east-northeast and east-southeast, (by compass.)

By observation he placed the anchorage in 54° 51′, but on Tebenkoff the north point of entrance is in 54° 57′, and the south, in 54° 54′; the outer islet is in 57° 56½′.

In latitude 55°, twenty-six miles north, 60° west from his position of Cape Kygane, La Pérouse lays down Cape St. Augustin, but no such promontory exists. From a thorough study of La Pérouse's narrative, and by plotting his positions on Tebenkoff, we find no reliance can be placed upon his general shore-line and positions.

CAPE BARTOLOMO.

Forrester Island and the Wolf Rock are nearly on the prolongation of the long, narrow peninsula stretching southward and terminating in Cape Bartolomo, in latitude 55° 12′, longitude 133° 33′, to the eastward of which peninsula lies a large archipelago, in large part explored, through which the Russian vessels are accustomed to pass. The cape is called Chirikoff on some of the Russian charts. Close to its southern extremity are marked sunken rocks with very deep water outside.

This cape is the southwest point of the southern entrance to Bucarelli Sound. From it the southeast point, named *Cape Saint Felix*, with a small islet on its southwest face, lies six miles south 72° east. The indications on Tebenkoff's chart that Bartolomo is comparatively low and wooded, and that for nine miles nearly north the peninsula is only a mile across. Saint Felix, on the contrary, is backed by a mountain two miles to the north-northeast.

BUCARELLI SOUND.

The sound eastward of the large island of which Cape Bartolomo is the southern termination is very extensive and filled with large islands, between which pass wide channels with deep water.

The channel between Capes Bartolomo and St. Felix is four or five miles wide, with bold water close to either shore. Its general direction is north by east for seven miles, then northeast twelve miles to the west point of the large island of Saint John; and the usual course is on the northwest side of this island. A great number of large bays are found along the shores of the numerous islands in this sound. The usual anchorage of the trading steamers is in Dolores Bay, which opens to the north, and lies ten miles to the north and east of Cape Bartolomo; it is two miles deep by one and a half wide; but the first bay inside the capes is Santa Cruz, opening to the west four miles north of Cape Felix; rocks lie half a mile off the northwest point of the entrance of this bay, which is three miles deep and over one mile wide, with soundings from twenty to ten fathoms.

The whole sound is too extensive to be described at this time in detail. From Cape Bartolomo its eastern extremity is about twenty-five miles east-northeast, and the northern entrance, among several, is twenty-five miles nearly north of

Bartolomo. From its southeastern waters at the eastern part of Ulloa Channel the Ileoak Strait runs south-southeast to the northwest part of Cordova Bay. Near the northern extremity a channel stretches eastward, and then to the north-northwest by the Schakhin Strait to the Otter Sound of Douglas, in latitude 55° 54′, and ten miles east-southeast from Cape Pole, at the north entrance to Clarence Sound.

Eight miles east of Cape Felix is another entrance to this sound; and the northwest part of the sound can be entered by several channels not yet thoroughly explored. Tebenkoff and the Admiralty Chart No. 2431 give the general features of the sound; and Sarytcheff's large Russian atlas of 1826 gives in detail the soundings throughout the shores. Sarytcheff erroneously credits the whole exploration to La Pérouse. This sound is Puerto del Bayli Bucarellio of Quadra, 1775, and deserves thorough exploration.

CAPE ADDINGTON.

This cape is the westernmost of the island forming the western boundary of Bucarelli Sound, and lies seventeen miles north 28° west from Cape Bartolomo. "A conspicuous promontory" (Vancouver III, 299) laid down by Tebenkoff in latitude 55° 27½′, and longitude 133° 45′, described by Meares, from the journal of Douglas, as a high bluff land lying in latitude 55° 28′, longitude 133° 39′, and forming the south point of a great bay lying east of the line joining this cape and Coronation Island. No name having been applied to this bay, we have designated it as *Iphigenia Bay*, after Douglas's vessel.

To this point Meares applied the name Cape Adamson. According to La Pérouse's view it was visible at a distance of forty-five miles from the northwest when he was off the Hazy Isles.

Between Cape Bartolomo and Addington recent charts indicate a passage from the sea to the waters of the sound in the bight four or five miles east-southeast of the latter, so that when made from the westward the land adjoining the two capes appears to rise as two islands, as indicated in La Pérouse's chart.

From Cape Addington the western end of Coronation lies north 30° west, thirty-one miles distant; and Cape Ommaney, at the western side of the entrance to Chatham Strait, lies nearly on the same course, at a distance of fifty miles. It will thus be seen that Capes Bartolomo, Addington, Coronation Island, and Cape Ommaney, lie nearly on the same course, which is the general trend of the outer coast and headlands from Cape Kygáne, in 54° 42′, to Cape Fairweather, in 58° 51′.

IPHIGENIA BAY.

This great bay lies eastward of the line joining Cape Addington and Cape Barnett, thirty-one miles south 27° east, and south 27° west of each other; and from the middle of that line the eastern shores lie twenty miles to the northeastward. From Cape Addington the general trend of the shores of the islands form-

ing the southeast shore of Iphigenia Bay and the north boundary of Bucarelli Sound is northeast for twenty miles, where numerous rocks are laid down, and where various channels among the islands lead into the northern part of Bucarelli Sound and into the southern entrance of Schakhin Strait; thence north-northwest about twenty miles along a shore indented by bays and guarded by islets to the Otter Sound and the north entrance of the Schakhin Strait; then west by south twenty miles to Cape Barnett, forming the west point of Coronation Island, and broken by the north entrance to Clarence Sound. In 1784 La Pérouse called the islands extending eastward from Coronation Island the Spanish Islands.

OTTER SOUND.

This sound was entered by Douglas in 1788, and it is judged that his point of entrance lies in the northeastern part of Iphigenia Bay, about latitude 54° 50′ on Tebenkoff's chart, behind an island two or three miles long, and one mile from the main shore. Douglas says that "having run a considerable way up the bay (Iphigenia) they entered the mouth of a straight passage, not more than half a mile across from shore to shore, steering north, (compass.)" By the number of whales which were blowing a long way within the passage, it was evident there was plenty of water for the ship. At eight in the evening they anchored in seventeen fathoms over a sandy bottom, about half a mile from the shore. In this situation the ship was entirely land-locked, except at the entrance, and the anchorage was named Sea-otter harbor. In pulling up the bay a passage was discovered out to sea, and so the ship lay on the east side of an island, and it was evident that the land forming the straits to the north consisted of islands. In three or four hours' pulling from the ship, and sounding, two arms of the straits were found, one stretching towards the north and the other to the east-southeast, (both compass.) The eastern arm is perhaps the north entrance of Schakhin Strait, and the northern leads to a long, unnamed inlet. On his chart Meares designates these waters as Otter Sound. When Douglas left the mouth of the harbor Cape Barnett bore southwest by west half west (compass,) and Cape Addington south-by west half west, (compass.)

The Admiralty Chart No. 2431, and Russian Chart No. 107, 1848, have an anchorage in a cove on the north face of the island, first north of Sea-otter harbor and southwest of the entrance to Schakhin Strait; no soundings given; latitude 54° 53′; island about two miles in extent. In a late work Sea-otter Harbor has been erroneously placed in Bucarelli Sound, but the foregoing examination clearly establishes its approximate position.

NORTHWEST ENTRANCE CLARENCE SOUND.

This entrance may be said to lie between Capes Pole and Decision, lying ten or eleven miles west-northwest and east-southeast of each other, with the large islands Warren and Coronation lying southwest broad off the entrance, and forming several channels thereto.

Cape Decision, on the west, lies in latitude 56° 03′, and Cape Pole in 55° 58½′.

Coronation Island lies five miles south of Cape Decision, with some large islands between them, but affording a passage one and a half mile wide between the cape and the nearest island by which vessels pass between Chatham and Clarence Sounds. Admiralty Chart No. 2431, and Russian Chart No. 10, have the western entrance south of the first island lying off Cape Decision; and Tebenkoff has an anchorage on the east side of the first island north of the west point of Coronation Island, but no soundings are given. Coronation Island is high, eight miles long east-northeast and west-southwest, by four miles wide, and the western point is laid down by Tebenkoff, in latitude 55° 55′, and longitude 134° 10′. Between the northeast part of the island and the nearest island an anchorage is laid down in one of the Russian charts, but no depth of water given. Douglas saw the island at a distance of thirty-five miles from the southward; he named the western point Cape Barnett, and says this island is low towards the sea, but rises gradually to a considerable height. His latitude is erroneous, having estimated his distance.

Warren Island is four miles east-southeast and west-northwest by two miles in width. Between it and Cape Pole, which is distant two miles to the eastward, lie several lurking rocks and islets. One and a half mile south of the middle of the island are several rocks; five miles south from the northwestern point of the island several rocks are laid down, and south by east six miles from the northwest point lies a small islet.

The entrance to Clarence Sound, between Coronation Island on the west and Warren Island on the east, is about six miles wide, and in mid-channel there is no bottom with one hundred and twenty fathoms of line.

No passage is laid down between Cape Pole and Warren Island, and vessels from Otter Sound and the north part of Bucarelli Sound pass west of the islets of Warren Island, and enter Clarence Sound between Warren and Coronation islands. For the description of this entrance to Port Protection see remarks under head of Port Protection.

PORT BEAUCLERC.*

On the western side of the northwest entrance to Clarence Strait, about eighteen miles north-northeast from Point Borlase, the northern extremity of Warren Island, lies a small island off the entrance to this port which is open to the east. In coming into the strait from the westward, round Cape Decision, the first point passed is St. Albans, about eight miles to the northeast of Decision; it is guarded by many rocks extending a mile from its extremity; and for eight miles northward of it the shore is bounded by islets and rocks extending two miles out to Amelius,* which lies a league south of the entrance to the port. The small

* Named by Vancouver, 1793.

island marking the entrance lies directly west of Mount Calder, and eight miles southwest quarter west from Point Baker, with an islet northeast of Baker in range with the point. The island in the entrance has some rocks around it, but lies over a mile from the north point of entrance, and a mile from northeast of the south point. This islet "admits of a good channel on either side."

The outer points of the entrance to the port lie about north-northeast and south-southwest, two miles from each other; thence the port stretches two and a half miles to the west-northwest, to the east side of a "small island with sundry rocky islets and regular soundings from thirteen to twenty fathoms." This island is in the middle of a narrow basin six miles long north and south, and from one to two wide, with a passage a mile long and half a mile wide on the northeast side of the island; and the other about the same width and a mile and a half long to the southwest.

This is "an extremely good harbor; its access and egress are free from obstructions except such as are sufficiently evident to be avoided." "The surrounding shores are in general moderately elevated, well covered with wood; water is very easily procured, as the communication with the shore is sufficiently commodious."

Vancouver places the northeast point in latitude 56° 17′, but without observation. He designated the northeast point as that which lies one mile inside the outer and northeast point proper.

PORT PROTECTION.

From Point Borlase, forming the northwest point of Warren Island, to the south point of the island in the northwest bend of the Clarence Sound, the general direction of the strait is north by east half east for twenty-five miles, with an average available width of five miles, both shores bordered by numerous islets and rocks. Thence the strait turns east round the northwest point of Prince of Wales Island, and runs twenty-five miles to the northeast point when it turns to the southeast by south, and at its northeast part receives the western entrance of Stikine Sound.

Port Protection is situated on the northwest extremity of Prince of Wales Island, where the Clarence Sound turns from its north and south course abruptly to the east. It opens to the northwest, and its southern extremity or head lies at the base of a very remarkable barren, peaked mountain, which Vancouver named Mount Calder. This extinct volcano is conspicuous in many points of view, not from its superior elevation when compared with other mountains on the main, but from its height above the rest of the country in its immediate vicinity, and from its being visible in various directions at a great distance. He observed upon it when four or five leagues west of Cape Addington, at a distance of over sixty miles. Point Baker is on an islet close to the shore at the northeast point of entrance, from whence the opposite point lies south 27° west, at a distance of three-quarters of a mile. The channel is good and free to enter, yet there is one

lurking rock, visible only at low tides, lying south 13° east, six hundred yards from Point Baker. The kelp upon it will give warning at high water, and on all sides there is a depth of from eight to twelve fathoms close to it.

This harbor has a general direction from mid-entrance south 36° east for about two and a quarter miles; its width from one thousand to six hundred yards; and the upper part terminates in shallow coves and a basin. The soundings are irregular, from thirty to fifty fathoms, and where Vancouver places the anchorage in twenty-one fathoms, the rock in the channel bears north 33° west, Point Baker north 25° west; the western point of the bay north 82° west, and a small islet, with rocks off its northwest point, lies east less than a quarter of a mile distant. On the east and southeast of this islet is anchorage in twenty to fourteen fathoms, but with contracted space. The bottom at the anchorage of Vancouver is hard and rocky, and the position exposed to north and northwest winds, but well protected from southeasters. The shores are in most places steep, rocky, and covered with an impenetrable forest of spruce and other trees. Several streams of fresh water are found, and halibut were caught by Vancouver.

Vancouver found the latitude of Point Baker 56° 20′ 30″, and Tebenkoff gives the longitude 133° 32′.

Vancouver gives a plan of the harbor which the United States steamer Ossipee used and found sufficient for all general purposes. She remained here during a heavy southeaster.

About a mile to the north of Point Baker is situated a bank on which soundings are irregular from fifteen to thirty-two fathoms, and at the meeting of the tidal currents causes a race and rip that appear dangerous, especially at the flood, but numerous soundings detected no less than fifteen fathoms upon it, and sixty fathoms between it and the shore.

Tebenkoff has a rock near mid-channel of the sound, lying about two miles west of the westernmost point of Port Protection, and another three or four miles southwest of the same point. They are not in Vancouver, but are on the latest Russian charts, and on Admiralty Chart No. 2431.

HAZY ISLANDS.

These islets lie eight miles west of Coronation Island, and, Vancouver says, "form a group of small rocky islets about a league in extent, lying south 7° east, at a distance of sixteen leagues from Cape Ommaney." (III, p. 298.) This is evidently an error of the text of Vancouver, who places them fifteen miles south of Ommaney and in latitude 55° 54½′, and south of the entrance to Chatham Strait.

Tebenkoff places them sixteen miles south of Ommaney and in latitude 55° 55½′, longitude 134° 25½′.

In 1787 they were named by Dixon, who placed them in latitude 55° 55′.

On the Russian charts they are known as the Tumannoi (Misty) Islands. La

Pérouse named a group of five islets La Croyère, described as being separated from the continent by a channel four or five leagues wide. He placed them in 55° 51′, about eighteen miles south of Cape Ommaney.

CAPE OMMANEY.

This headland lies in latitude 56° 10½′, longitude 134° 28½′, and forms the western point of the entrance to Chatham Strait. The eastern point of entrance is Cape Barnett, Coronation Island. Abreast of Ommaney the strait is twelve miles wide, and the eastern shore remarkably broken by bays and guarded by rocks.

This cape is the southern extremity of Baranoff Island, upon which Sitka is situated. It "constitutes a very remarkable promontory, that terminates in a high, bluff, rocky cliff, with a round, high, rocky islet lying close to it, and by its shores on its eastern side taking a sharp northerly direction it becomes a very narrow point of land, which, having been seen by Captain Colnett in his mercantile expedition to this coast, was by him named Cape Ommaney, and the opening between it and Cape Decision, Christian Sound," being the entrance to Chatham Strait. (Vancouver, III, pp. 266, 267.) This rocky islet "was named Wooden's Rock" (Vancouver, III, p. 298.)

The land to the northward of the cape was observed upon by Vancouver at a distance of fifty-seven miles when off Capes Addington and Bartolomo.

La Pérouse named this cape Tschirikoff, and placed it in latitude 56° 13½′.

CHATHAM STRAIT, WITH ITS PORTS AND INTERSECTING STRAITS.

This magnificent arm of the sea stretches in a straight line through the northwestern part of the Alexander Archipelago. From Cape Ommaney, in latitude 56° 10′, where it is twelve miles wide, to the head of the eastern arm, in 59° 20′, it maintains a nearly uniform width of seven or eight miles, with no dangers except close along the shores. The depth of water is very great, and no soundings have ever been laid down in it. In latitude 58° 32′ we found no bottom with one hundred and fifty fathoms of line. Its general direction is north 13° west for two hundred miles, and if the chart of Tebenkoff is correct, a course drawn throughout its length would not touch either shore. From it branch the great straits eastward and westward, leading to the base of the coast range of mountains and to the Pacific Ocean. Its northern termination is in a higher latitude than Mount Fairweather, while the peninsula between them, terminating on the north shores of Icy Strait, is a region unexplored, and from all indications the home of the glaciers. The entrance to this strait was named Christian Sound by Colnett in 1788.

La Pérouse, in honor of Behring's commander, who landed under a cape in this latitude, and had two boats' crews massacred by the Indians, named the entrance Tschirikoff Bay, as to him it bore the appearance of a spacious bay

behind Cape Tschirikoff. Ten miles from the islands off the entrance he experienced very strong currents. He gives a view of the coast hereabouts, taken from a position west of the Hazy Islands, with a high mountain bearing north 40° east on the east side of Tschirikoff Bay.

PORT CONCLUSION AND PORT ARMSTRONG.

Between five and six miles northward from Cape Ommaney, on the western shore of Chatham Strait, lies the entrance to Port Conclusion, whose southern point is formed by an island about a quarter of a mile long, north-northwest, with deep water all around it, except toward the main point southwest of it; between these lie an islet and sunken rocks. From this island to the north point of the bay the direction is north, and the distance one mile, with seventy-five fathoms of water in mid-entrance. From the middle of the entrance the bay has a direction south 27° west for two and three-quarters miles, contracting for the last mile to a little over a quarter of a mile in width, with forty-four fathoms of water. No rocks are known to exist in the bay, and the deepest water in the bay is eighty-seven fathoms, about half a mile west by north from the south point of the island. Three-quarters of a mile inside the south point there is a small cove, one-quarter of a mile in extent, facing north, with anchorage over irregular bottom in from five to fifteen fathoms. One and a quarter mile inside the entrance is a very narrow cove, one-quarter of a mile long, about one-eighth of a mile in width, with four fathoms of water, and opening to the southwest or contracted head of the bay. In this cove Vancouver anchored. The head of this cove is separated by only one-quarter of a mile from the head of another bay southeast, and leading from the strait. It is one mile long, runs nearly north, and has a very narrow entrance, with four fathoms. Inside are soundings in seven or eight fathoms. The Russian chart designates this as Alexander Bay.

The latitude of the north point of the island forming the south point of Port Conclusion is 56° 16′, and longitude 134° 27′.

The north point of Port Conclusion, called Point Eliza, also forms the south point of Port Armstrong, which has an opening to the east from the strait of less than a quarter of a mile in width for half a mile in length, with soundings from ten to seven fathoms. Inside this narrow channel the bay expands to a basin one mile long by half a mile wide, with thirty-four fathoms of water, decreasing to twelve and eight close to the shores. The general direction of this port and its entrance is south 70° west, and extends one mile and a quarter.

Vancouver gives a plan of it and describes it in volume II, pp. 268, 269.

The head of Port Armstrong is only one mile east of the head of Lisvinitchny Bay, making in from the west side of the peninsula.

PORT MALMESBURY.

This bay lies directly east of Port Conclusion, on the eastern shore of Chatham Strait, sixteen miles north 60° east from Cape Ommaney, and twenty-three

miles north of the west point of Coronation Island. Between Cape Decision and the harbor the intermediate shore is deeply indented by many small open bays and guarded by numerous rocks. The harbor is easy of access by keeping near the southern shore, and affords very excellent shelter, with soundings from seventeen to thirty-four and twelve fathoms of water. From the entrance its direction is northeast for three miles, then south-southeast for three miles, with some rocks and islets in it. It is conveniently situated to the ocean, and has its north point in latitude 56° 17½′ and longitude 134° 07′. Its north point is called Point Harris, and rendered very remarkable by being a projecting point on which is a single hill, appearing from many points of view like an island, with an islet and some rocks extending nearly to the southwest of it. (Vancouver, III, p. 286.) He gives no plan of it, but its entrance and general features are exhibited on Tebenkoff and other Russian charts, and on Admiralty Chart No. 2431.

Four or five miles northward of Port Conclusion is a wide bay leading three or four miles westward, with two arms, one to the north and the other to the south. The head of this bay, not named, is within two miles of the head of *Toporkoff* (*i. e.*, *Puffin*) Bay, leading eastward from the west side of the peninsula. Thence northward the western shore is broken by numerous bays to southeast point of Peril Strait in 57° 22′.

The eastern shore, being the west side of Brooof or Keriou Island, is very much broken by numerous bays, islets, and rocks.

Point Ellis is the first prominent point on the eastern shore, north of Port Malmesbury. Vancouver placed it in latitude 56° 31′, and the latest charts give the longitude 134° 47′. Along the northeast shore of Point Ellis a bay ten miles long stretches to the northeast. From its head to the head of Port Camden, leading northward from Frederic Strait, a portage is used by the Indians, who carry their canoes across it.

Point Sullivan* is in latitude 56° 38′, and longitude 134° 16′.5. From it the shore is less rocky and more compact for thirteen miles north 9° west to Point Kingsmill.† At this point Chatham Strait is seven miles wide, with the opening of a small bay on the western shore, laid down on Tebenkoff about west by south from Point Kingsmill.

Point Kingsmill, about forty-two miles northward of Cape Ommaney, is the southwest point of the entrance of Frederic Strait into Chatham Strait. The northwest point of entrance is Point Gardner, lying ten or eleven miles northwest by north half north from the former, with a small low-wooded islet, named Yasha Island, on the same course, about three miles off Point Gardner.

POINT GARDNER.†

This point is the southwestern extremity of Admiralty Island, is about two miles long by three-quarters wide, and stretching south-southwest into Chatham Strait, reducing its width to less than five miles.

* Named by Vancouver.

† Named by Vancouver, 1794.

From this point some rocks lie three-quarters of a mile south 23° east, and on the same bearing Yasha Island, small, low, and wooded, lies about three miles distant. By observation Vancouver placed the point in latitude 57° 01′, and Tebenkoff gives its longitude 134° 26′.5 south. About two miles east of the point lie two islets, and between them and the point is laid down an anchorage for the trading vessels, but no soundings are noted. This anchorage is open to the south, and the ocean swell from the southward is said to be felt here. At or near this point the Indians report coal.

The eastern shore of the strait, northward of Point Gardner, is uniformly bold, indented by bays and free from shoals. The main island is comparatively high and wooded.

The first anchorage is at the bay called the Lower Koutsnow, eleven miles northward of Point Gardner, and is reported good by the Saginaw. One mile broad off the middle of this bay lie some rocks; the track of the trading vessels is laid down east of them. The latitude is 57° 11′.5 and longitude 134° 30′.

Twenty-three miles north of Point Gardner is the broad open bay, named *Hood's Bay* by Vancouver, with a large island under its northern shore. On the north side of this island, about three miles eastward of its western point, is laid down the anchorage of the trading steamers, abreast the large settlement called Koutsnow. The Saginaw reports "several anchorages in and around Koutsnow," one abreast the Indian settlement, one to the right, and one in the channel-way below the rapids, one to the northward and westward of the island, forming the northwestern boundary of Hood's Bay, in latitude 57° 28′.5, longitude 134° 34′. No soundings are given.

The northwestern point of Hood's Bay is formed by Point Samuel, and between this point and the large island southeast of it is the entrance to *Mud Bay*, an unexplored water, nearly dividing Admiralty Island, and reported to have a violent race at its entrance at certain states of the tide. This great extent of water forms really an "inland archipelago," being filled with numerous islands. Rapids are encountered inside; abundance of all kinds of fish.

In 1868 there was opened in this bay "a mine of the best bituminous coal yet found upon our Pacific coast," by the United States steamer Saginaw.

In coming eastward through Peril Strait, Admiralty Island, to the eastward, looks like a great wooded, low plain, being the space occupied by this great bay and adjacent low shores.

Directly west of Hood's Bay, Peril Strait enters the west side of Chatham from the ocean through Salisbury or Klokatchef Sound, and by Sitka Sound. The two points are Schkaliakh Point at the south, in latitude 57° 24′, and Point Tlakinikut at the north, in latitude 57° 29′, and lying nearly north and south of each other. The western part of this strait lies nearly west-northwest and east-southeast for twenty miles.

In the strait off Point Schkaliakh lie numerous rocks and islets, with one or two available anchorages. We anchored in sixteen fathoms, soft bottom, between

the islets and the mainland southward. But it is not advisable to pass among them without a pilot. (See remarks upon Peril Strait.)

Close under the western shore of Chatham Strait, about seven miles northward of Peril Strait, Tebenkoff notes a white rock, not laid down on other charts. Nearly east of it, on the eastern shore, is the *Point Parker* of Vancouver, in latitude 57° 37′, while a league to the southeastward of it, in a small cove, is an opening about the eighth of a mile wide. In the entrance Whidby found five fathoms of water, but after advancing half a mile in he found it full of shallows. The adjacent land to the south and east is low and wooded. At this entrance he obtained herring from the Indians, July 1794.

*Pavloff Harbor** lies on the western shore, twenty-one miles north of Peril Strait, and fifteen south of Icy Strait. Two openings are found here, each about a mile wide, with an intervening point of low, wooded land. The southern opening leads west and then north-northwest by an unexplored channel thirty-five miles long to Icy Strait. The northern opening is that of Pavloff Harbor, about a mile wide, with the points bearing about northeast and southwest from each other. The general direction of the bay is northwest for eight miles, but Tebenkoff lays down the anchorage in a cove on the south shore about two miles inside the south point, but gives no soundings. The admiralty chart notes a cascade three miles inside the entrance.

The north point of the entrance is in latitude 57° 51′, longitude 134° 57′, according to Russian authorities.

The eastern shores of the strait, both north and south of Pavloff Harbor, are comparatively low, but densely wooded, the immediate shore line being "alternate steep rocky cliffs and small sandy bays, with a few detached rocks and islets lying close under it."

Icy Strait or *Cross Sound* † connects Chatham Strait with the ocean, and makes in from the westward between Points Augusta † and Couverden †, the latter lying nine miles north 15° west from the former. Whidbey placed Point Augusta in latitude 58° 03½′.

It is high, covered with timber, and has some rocks close under it. Two and a half miles north-northeast of the point Tebenkoff lays down some rocks in midchannel, but the other Russian and admiralty charts place them close to Point Marsden on the eastern shore. Tebenkoff designates the trading tracks close along Augusta Point, and west of the rocks. Five miles east-northeast from it is the contracted anchorage of Spaskia Bay.

Under the southwest shore of Point Couverden, "at a distance of two miles to the northwest of the point, there is a small cove opening to the south, with an island lying before it, and a mile south of the point lies a high, barren, rocky islet." This latter is laid down on the Russian charts, but not on Admiralty Chart

* Tebenkoff's chart. Admiralty Chart No. 2431 calls it New Harbor. By the Saginaw it has been called Freshwater Bay.

† Named by Vancouver.

No. 2431. "About two miles northward of the point are one small island and three rocky islets," one of which lies nearly in mid-channel. Thence northward the shore is formed by a narrow border of low lands, well wooded with large trees and backed by high mountains covered with snow. It is nearly straight, and its general direction is north by west half west for sixty miles to the mouth of the Chilkaht.

Abreast of Point Augusta the strait is much contracted by *Point Marsden,** lying less than four miles northwest from the former, in latitude 58° 06′.

Northward of Point Couverden the strait has a width of four or five miles for eleven miles to *Point Retreat,** on the eastern shore, and forming the northernmost point of Admiralty Island, and placed by Vancouver in latitude 58° 24′, and by Tebenkoff in longitude 134° 59′.

For six or eight miles of this island south of Point Retreat the land is low, level, and heavily wooded, and from its formation would well suggest the name of Terrace Point. When rounding the north end of the point we had a short view of a great glacier bearing north 15° east by compass, but with the thick, squally weather it was difficult to estimate its distance. It doubtless comes from the southwest flank of the high mountain named the Lion's Head by the United States Coast Survey, situated about fifteen miles east of Berner's Bay, and from which a stream empties into the strait about ten miles north-northeast of Point Retreat. This stream has a very extensive shoal off its mouth.

Barlow Cove* lies on the east side of Point Retreat, and stretches five miles to the southward, with a width decreasing from two miles to one at the head, near which we anchored in sixteen fathoms muddy bottom. The extent of the bay and its safety is increased by a long island stretching nearly across its entrance on the northeast, but allowing good passages to the westward of it, both northwest and southeast. The shores of the bay are well wooded, low, and composed of regularly stratified, fine-grained mica schists, lying northwest and southeast magnetic, and containing large quartz veins, in which we found nothing but iron pyrites. The dip of the stratification is vertical.

Point Retreat is the northwest point of the north entrance to Stephen's Passage, leading ninety miles eastward and southward to Frederick Sound.

In the middle of Chatham Strait, three miles north of Point Retreat, is a large comparatively low island, whose northwest extremity stretches six miles northwest to within three miles of the west shore of the strait.

Tebenkoff gives the trading tracks on either side of this island, but other charts place the track only to the west, and fill all the space between the eastern side of the island and the main with islets, and the great bank off the river mouth. Vancouver says Whidbey found this channel difficult to navigate even with boats; numberless rocks lay between the group of islets and the continent, from the shores of which a shallow bank extends nearly half a league. Two miles

* Named by Vancouver in 1794.

northwest of the northwestern point of this island no bottom is found with one hundred and fifty fathoms of line.

Whidbey Point is the name applied by the Coast Survey (1867) to the wooded projecting point on the west shore of the strait, about twenty-three miles north 10° west from Point Couverden. A small islet lies close to its southeast point, where Whidbey observed the latitude 58° 35′. This point "forms a projecting promontory about a league long in a northerly direction."

*Berner's Bay.**—Five or six miles northeast by east from Point Whidbey lies Point Bridget, the southwest point of Berner's Bay. The northwest point of the bay is Point St. Mary,* and lies north 20° west, about four miles from Bridget, while the bay is five miles deep in a north-northeast direction. No soundings are given in this bay. Both points are low, and heavily wooded. Vancouver places Point St. Mary in latitude 58° 43½′, and Tebenkoff in longitude 135° 02′.

Northward of this the shores of the strait are compact and straight, but the width decreases very gradually to six or seven miles in latitude 58° 54′, where a long island on the western side contracts it to four or five miles.

Off the southern point of the larger island is an islet about two miles from the western shore, and this was Whidbey's place of observation.

From this islet the larger island, which is one mile broad, stretches north-northwest about five miles parallel with the western shore, and leaving a channel about a mile wide, but having at its southern entrance shoals that extend nearly across it.

*Point Seduction.**—In latitude 59° 02′, according to Vancouver, lies the south point of a tongue of comparatively low land, one or two miles broad, stretching twelve or fifteen miles south-southeast, directly into the middle of the strait. From this point stretches "a range of small islands about four miles in a southerly direction; all have trees upon them except the southernmost, which is a flat, barren rock."

The western arm, about two miles wide, receives the river Chilkaht; and the eastern arm, about three miles wide, has low land at the head, but is not known to receive a stream of any size.

DAVIDSON GLACIER.

In latitude 59° 07′, abreast of Seduction Tongue, a magnificent glacier issues from a narrow gorge between high, bold, snow-covered mountains on the western shore, and has forced out a low point, now covered with spruce trees, into the strait. When we passed it, going northward, the fog hung over it so closely that we could see, over the timber, only a part of its deep scarred front. Southward of the main glacier a small branch comes through a crooked ravine to the water's edge. From our anchorage, abreast of Observatory Island, near the mouth of the Chilkaht, we obtained measurements of the part of the main glacier visible east of the mountain's flanks. Assuming the distance at six statute miles, the part exposed

*Named by Vancouver, 1794.

was fifty-seven hundred feet long; of this, forty-two hundred and sixty-five feet had a very uniform and regular inclination of 4° 43′ 21″, and the height of the part cut by the mountain-side, or fifty-seven hundred feet from its front, was six hundred and forty-five feet above the water. After leaving the gorge it spreads itself into a vast fan-shaped mass from two to three miles broad. The moraine in front is a low flat about a quarter of a mile in width, and composed of fragments, sometimes of great size, of slate, sienitic granite, and a fine crystalline, beautiful, white marble. Two moraines are found on its northern slope.

CHILKAHT RIVER.

This moderately large stream enters the northwesternmost branch of Chatham Strait in latitude 59° 13′, by the determinations of the United States Coast Survey, and lies about eight miles further north than Point Seduction. Abreast of Glacier Point the branch is only one mile in width, with the deeper water near the eastern shore. Two or three miles north of the glacier the width is nearly three miles, with a moderately large wooded island close to the eastern shore, which is indented by several small bays, but where no soundings are laid down. Five or six miles north-northwest of Glacier Point is a low, burnt-off point, with fifteen to twenty fathoms half a mile east of it, and a small cove on the northwest side of it, open to the northeast. Anchorage is laid down here in eighteen fathoms by Lindenberg, and it would appear a better anchorage than in the open branch, where the strong ebb currents of the river, running against a strong southerly wind, make a very disagreeable berth. At this anchorage *Pestchani (Farewell)* Island, a small, pyramidal, treeless islet, occupied by the Coast Survey as an astronomical station, will bear northeast by north one and a half mile. Between this bay and the island soundings are given from twelve to twenty-seven fathoms. Shoal ground surrounds the island for a couple of hundred yards, and stretches northeast towards the main, leaving a narrow channel of only four fathoms on its east side. The beach of the island is strewn with large, erratic boulders. We anchored about one mile northwest by west from the island in fifteen fathoms, with a very tenacious blue muddy bottom, affording capital holding ground, but with southerly squalls tailed into three fathoms. The river is a mile and a half wide at its mouth, and runs ten miles northwest, to which distance three feet can be carried at half tide. At low water the bar appeared to be dry all the way across. The influence of the tide is felt but a short distance. At Cascade Point, on the west side of the bar, the rise of the tide is only eight feet, and at Point Jila, about five miles inside the bar the rise is only one foot.

The general direction of this river is to the northward between high precipitous mountains, whose sides are in great part destitute of timber, and exhibit constant disintegration by the action of the frosts. Sir George Simpson says the Indians ascend it about fifty miles to a valley running towards Mount Fairweather, and containing a large lake, which pours its waters into the open ocean at Admiralty (Behring) Bay. This can hardly be the geographical fact. The Indians

reported to us they ascended the river for twenty days to a great lake, (whence they make a portage to the Lewis River,) and could descend the same distance in two days.

The astronomical station of the Coast Survey was on the small treeless islet named *Pestchani (Farewell)* or Sandy, off the mouth of the Chilkaht, and the determination of the geographical position differs from the survey of Lindenberg for the Russian-American Company. The latitude is 59° 11′ 43″ north, the longitude 135° 25′ 04″ west, or in time, 9*h*. 01*m*. 40.3*s*. Lindenberg placed it, by his survey, in latitude 59° 06′.4, and longitude 135° 36′.7, while Whidbey placed the bar of the river in 59° 12′. A sketch of Chilkaht River and approaches, showing anchorages, &c., is given on the Russian map No. 10, of the Pacific series.

From our anchorage off the bar of the river a remarkable snow-clad peak across the strait bore south 46° east, true, rearing its head far above its fellows in the range, and attaining an elevation of six thousand feet by estimation. From the striking resemblance which the upper northern profile presented, it was very appropriately named the Lion's Head.

For thirty or forty miles along the eastern shore of the strait there is a lofty range of snow-covered and sharp-pointed mountains, in which every marked depression has its glacier of greater or less extent.

The northern part of Chatham Strait, northward of Point Retreat, was named Lynn Canal; but there seems to be no reason for applying three distinct names to one great strait, so uniform in width and direction, and so free of islands.

In the northern part of Chatham Strait we noticed that many of the topmost branches of the trees were trending to the northward, indicating that the prevailing winds are from the southward. On many parts of the adjacent shores, and especially of Seduction Tongue, near the *Pestchani (Farewell)* Island, the timber had been destroyed by fire; indicating less annual rain than at Sitka.

STRAITS INTERSECTING CHATHAM STRAIT.

*FREDERICK STRAIT, ITS BAYS, HARBORS, AND INTERSECTING PASSAGES.

This strait runs twenty-four miles northeast by east, to two miles north of Povorotny (Turnabout) Island, with an average width of ten miles, when it turns east by south for thirty-two miles to where the Souchoi (Dry) Channel leads to the Stikine river and the Wrangell channel to the Stikine Sound and Clarence Strait. Northeast of Povorotny (Turnabout) Island lies the south entrance of Stephens † Passage with a width of eighteen miles, east and west, between Nepeau Point and Cape Fanshaw.† Povorotny (Turnabout) Island is usually passed to the northward, as

* Named Prince Frederick Sound by Vancouver in 1794.
† Named by Vancouver in 1794.

rocks are laid down between it and the southern shore, but the commander of the Saginaw reports that it may be passed to the southward, in which case keep "close aboard around the northwest point of Kuprianoff Island."

From Point Kingsmill to Point Cornwallis* the south shore trends north 47° east for seven miles. The space between these two points is occupied by two bays, each taking a general southeast direction; one to one and a half mile in width, with a length of four or five miles, and filled with many islets and dangerous rocks. In the first bay under the western point was the Kake village in 1867.

The second bay has been (1868) named Saginaw Bay;† the anchorage is about a mile and a half inside Point Cornwallis, on the port hand going in, and nearly abreast of the Indian village, both east and west, in from seven to eleven fathoms over muddy bottom. Although open to the northwest the anchorage is completely sheltered, but is of limited extent, there being ground enough for about a dozen large vessels. It is very easy to find the anchorage, which can be entered either by sailing vessels or steamers with fair or head winds.

It is contemplated to establish a United States military post at this place; and it may become important for cod fishing, as the fish are reported to run in great numbers, in the summer, around and near its entrance.

The geographical position of the Indian settlement is in latitude 56° 56′, longitude 134° 10′, according to Tebenkoff and Admiralty Chart No. 2431; but the Saginaw places it in latitude 56° 55′.5, longitude 134° 00′.5.

Eastward of the long, low, narrow, wooded point Cornwallis, lies the Kake Strait,‡ from four to five miles wide, leading southeast and south nearly forty miles to the northwest bend of Clarence Strait, directly opposite Port Protection. It is filled with an intricacy of rocks and islets, yet through which one of the small trading schooners beat to the northward in 1867. The northeast point of entrance to the Kake Strait is Point Macartney,* in latitude 57° 01½′ and longitude 133° 56′, and eleven miles northeast by east quarter east from Point Cornwallis. Vancouver describes this as a large, rounding, but not lofty promontory, in which are several small open coves, and near it several detached rocks.

Hamilton Harbor.—On the east shore of Kake Strait and about eight miles south-southeast of Point Macartney lies the entrance to Hamilton Harbor, about a mile wide and stretching five miles in an easterly direction. Two islets lie westward of the southwest point of entrance. An arm of this harbor runs two miles north-northwest just inside the north point. In this harbor Vancouver found the sites of no less than eight old Indian villages; but it is now of importance as being the locality where "a mine of good bituminous coal has been partially opened," (July 31, 1868.) The location of this mine is on the south side of the harbor, three miles from the south point. "The chart exhibits the approaches as being difficult navigation, on account of islets and rocks; but it is not so, at any rate for steamers." The Saginaw gives its latitude 56° 52′.8 and 1° 43′.5 east of

* Named by Vancouver in 1794.
† Named by the United States navy.
‡ Keku Strait on all Russian charts.

Sitka, or 133° 34′.2 west. Tebenkoff and other Russian maps place it in 56° 54′, longitude 133° 36′.

Port Camden.—This is an arm of Kake Strait, opening to the north on the western shore about five miles directly south of the south point of Hamilton Harbor. It is about a mile and a half wide at the entrance, runs south five miles, then south-southwest six miles further, with a decreased width of a mile. Several islets exist at its entrance and through its length. In a cove on the east shore seven miles from the entrance, coal was reported (May 1868) to exist in several small veins, cropping out about twenty feet above low-water mark, with intervening strata of hard rock. The coal itself is about six inches in thickness and the veins are at varying distances, from twenty to fifty feet, from each other. They have a dip to the southward of 35° to 40°, and their direction is nearly east and west.

The entire beach is a formation of sandstone from high to low water mark, and a rise and fall of tide estimated at thirty feet. The harbor is perfectly safe, with good anchorage in six to fifteen fathoms, soft muddy bottom. Numerous streams flow into the harbor, and the adjacent country is thickly wooded.

According to Admiralty Chart No. 2431, the position of this coal is in latitude 56° 42′, longitude 133° 50′.

Portage Harbor.—Twenty miles east by south half south from Povorotny (Turnabout) Island, in Frederick Strait, lies the entrance to Portage or Perenosna Harbor, one of the anchorages of the Russian and English trading steamers, but no soundings are given. An islet lies off its northern entrance, which is open to the north and readily noticed in passing. The country on either side is only moderately high and timbered. The harbor has a general south-southeast direction for four miles, and its head is only two miles from the head of Duncan Channel, coming in from Stikine Sound. The country between this and Point Macartney is low and moderately wooded for three or four miles back, but the cape of which Macartney is the western point is quite high and heavily timbered.

*Point Vandeput,** on the north side of Frederick Strait, lies about ten miles east by north from the islet off Portage Harbor, with rocks stretching one mile south of its extremity. Vancouver says this low, narrow point of land is two miles long and about half a mile broad. On its western side and at its junction with the main is an anchorage of the trading steamers, but with no soundings given.

According to our bearings from the three islets near the entrance to Wrangell Passage, a magnificent glacier exists at the head of the cove or bay on the east side of Point Vandeput. But the weather was thick and rainy, and the various charts of this locality are very different in their details, so that this glacier may be in reality one laid down on Tebenkoff nine miles southeastward of Point Vandeput, in latitude 56° 59′, at the head of a small bay east of a point about six miles northward of Wrangell Strait. Vancouver says that along this shore is a

*Named by Vancouver in 1794.

small extent of low, flat land, well wooded, lying immediately before the lofty mountains which here rise abruptly to a prodigious height. A few miles to the south of this low margin the mountains come directly to the water's edge and "presented an uncommonly woful appearance, rising to a vast height, and loaded with an immense quantity of ice and snow overhanging their base, August 1794."

In the winter of 1853–'4 one of the California ice ships took in a cargo of ice from the face of one of these glaciers.

Wrangell Passage.—This is the passage from Stikine Sound to Frederick Sound, by which the interior navigation of the great archipelago is completed without going outside. It has not been surveyed in detail, but a Russian reconnoissance has been published by which a vessel at low water may be in a measure guided, but without a pilot it is advisable to sound ahead, and make the passage about low water.

In coming from the north the entrance may be readily found; vessels keep close along the western shore of Frederick Strait, and three miles after passing the cape lying south of Point Vandeput, go on either side of three small wooded islets, lying about a mile off the western shore. Tebenkoff has but two islets; we noted three. About three or four miles southward of these islets the narrow opening of Wrangell Passage is seen. The general direction of the passage is north and south and its length about eighteen miles. About midway two channels enter it; one from the southeast opening opposite Vauks Island; the other from Duncan Channel. Both have small islets in their entrances and a vessel will not be misled by them.

The shores on both sides of the Wrangell Straits are generally low and flat, covered with spruce, and cut by numerous sloughs, affording water-courses from the high mountains in the background.

Vancouver says the land lying between Kake Strait and the main is chiefly of moderate height, and produces a "noble forest of large and stately pine trees of clean and straight growth;" and the shores along the bays, arms, and straits, between Chatham Strait and the main, are in general low, and apparently fit for cultivation if cleared of wood.

*STEPHENS STRAIT.

From the north side of Frederick Strait, twenty miles from its junction with Chatham Strait, opens Stephens Strait, with a width of twenty miles between *Nepeau Point* on the east and Cape Fanshaw on the west. The former is placed by Vancouver in latitude 57° 10′, and described as a high, steep, bluff, rocky point, off which lies a ledge of rocks about half a mile. From it *Povorotny (Turnabout)* Island lies five or six miles east-southeast. Cape Fanshaw is placed in latitude 57° 11′, and described as a very conspicuous, low, projecting point, from which one shore trends sixteen miles east-southeast towards Point Vandeput, and the other north eighteen miles to Point Windham.*

* Named by Vancouver in 1794.

From this broad entrance the strait runs north by east for eighteen miles to Point Windham, where it is contracted to three miles in width; then northwest by north three-quarters north forty-five miles to Point Arden, with an average width of five miles; then west-northwest for thirty miles to Chatham Strait, at Point Retreat, in latitude 58° 24′. The southern entrance is marked by numerous islets, but with broad passages and deep water between them; the western shore is much broken. The eastern shore is indented by the large bay named Port Houghton.* The entrance is three miles wide, with Point Walpole on the south, and Point Hobart on the north, lying north 11° west and south 11° east from each other. Off Point Walpole lie a number of small islets. Off Point Hobart extends a bank of sand for a little distance from shore; but there is a clear passage between it and the islets, to the eastward of which a snug anchorage is found at a considerable distance from shore in ten and six fathoms of water over sand and muddy bottom. The bay extends south 70° east for five or six miles, and is bounded by lofty mountains, from whose bases extends a small border of low land forming the shores.

About sixteen miles from Frederick Strait, and apparently in the middle of Stephens Strait, when seen from the south, stretches Point Hugh, with the strait on the east and Seymour† Bay to the west. Point Hugh is a "lofty, rocky promontory," off which extends a ledge of rocks upon which there are considerable breakers in a southeaster.

Seymour Bay opens between Points Gambier and Hugh, lying north 29° east and south 29° west, five miles from each other. The channel has an average width of three or four miles, and runs northwest by north for twenty-nine miles, terminating in latitude 57° 51′. Numerous islands occupy the northern ten miles of the bay. The adjacent country is moderately high, and is covered with timber of large growth, except towards Point Hugh.

Point Windham is in latitude 57° 30′, and lies northwest by west from Point Hugh four or five miles, but the nearest shore is directly west, and only three miles distant.

Northward of Point Windham the eastern shore is broken by two large bays. The first is *Holkham Bay*,* with Point Astley for the south point, and Port Coke for the north, lying north 29° west, about four miles from the former. In the middle of the entrance is a small island, towards which a shallow bank extends from either shore. There are two other islets inside, and about which Vancouver found much floating ice in August, 1794. The bay is seven or eight miles deep, and "bounded by the lofty range of mountains." From Point Coke, in a direction south 43° west two and a half miles distant, are two rocky islets nearly in the middle of the strait. The trading steamers pass on either side of them.

The second bay is twenty-two miles from Point Windham, and was named Port Snettisham by Vancouver. The south point of entrance is *Point Anmer* and

* Named by Vancouver in 1794.
† Named Seymour's Channel by Vancouver, 1794.

the northwest point is *Point Styleman*, situated in latitude 57° 53′, and lying two and a half miles north 33° west from the former. The bay extends northeast four miles and then southeast three miles; the shores are high and steep and produce very few trees.

The Russian traders use an anchorage in latitude 58°, ten miles from Point Styleman, on the same shore; no name and no soundings are given. Twelve miles northwestward from Point Styleman a "high, round island" lies in the middle of the strait, with the trading vessels' track on the east side.

Point Arden, on the west shore, is placed in latitude 58° 09′, and in longitude 134° 19′, both by reckoning. Here the strait turns abruptly to the westward, while the glacier arm leading to a small river, erroneously called Táhco River, opens four miles to the northeast of it.

The trading post of the Hudson's Bay Company, named *Takou*, is situated in a snug, well protected harbor, opening by a narrow entrance into Stevens Passage from the main shore, at a point about six miles southward of Point Salisbury. There is a small, thickly wooded island in Stevens Passage a little to the northward of the entrance to the harbor, by which mark it is easily found.

*GLACIER ARM †TAKU RIVER.

This arm of Stephens Strait opens from the great bend of Stephens Strait; its western point of entrance is *Point Salisbury*,‡ about latitude 58° 12′, and longitude 134° 13′. With a width of two or three miles it extends thirteen miles north 11° east, when the eastern shore trends east three miles and a large basin is found with a small islet nearly at its northeast extremity. The shores are backed by high mountains, in every gorge of which is found a glacier. Vancouver says that in August he found a compact body of ice around the shores of the basin, and the adjacent mountains rose with almost perpendicular sides to great elevations; their bases bordered by a narrow fringe of low rocky shore, with a few scattered dwarf spruce. From the gorges of the mountains around the basin immense bodies of ice were projected with perpendicular faces to the water of the basin, which then admitted of no landing for boats. Simpson, in 1842, says that one of the hills near the fort terminates in the form of a canoe, which serves as a barometer. A shroud of fog indicates rain. Vancouver found the tide to rise upwards of eighteen feet.

This arm is in reality the outlet of the Taku, which empties into the northeast part of the basin east of the islet. The general direction of the river is said to be towards the northeast. Simpson writes that, "this stream, according to Mr. Douglas, who ascended it for about thirty-five miles, pursues a serpentine course between stupendous mountains, which, with the exception of a few points of alluvial soil, rise abruptly from the water's edge with an uninviting surface of

* The name on Tebenkoff, 1848.
† This must not be confounded with the Táhco River of the interior.—DALL.
‡ Named by Vancouver in 1794.

snow and ice. In spite of the rapidity of the current the savages of the coast proceed about a hundred miles in canoes, and thence trudge away on foot the same distance to an inland mart, where they drive a profitable business, as middlemen, with neighboring tribes.

In 1840 there was built an establishment of the Hudson's Bay Company at the mouth of the river. The fort was "complete, with good houses, lofty pickets, and strong bastions;" its complement of men was then twenty-two.

There are great numbers of deer in this region; in 1842 no less than 1,200 skins were obtained. Bighorn sheep and the mountain goat are very numerous in this neighborhood. The latter has an outer coat of hair not unlike that of the domestic variety of the species. Instead of wool, the bighorn has a thick covering of hair much resembling that of the red deer, but, with the exception also of the size of the horns, it slightly resembles the domestic sheep.

Simpson says seven tribes of natives visited the Taku: four from the main and three from the archipelago; they numbered 4,000 souls of the Thlinkit nation.

The northwestern part of Stephens Strait is nearly filled by a very large island named Douglas, twenty miles long and six miles broad in the middle, but narrow at each end, particularly the eastern, which terminates in a sharp point. The channel to the south of the island is about two miles wide, with a bay on the south shore. The channel is frequently filled with floating masses of ice from the glaciers of the main.

FROM CAPE OMMANEY TO CAPE EDGECUMBE.

From Cape Ommaney, in latitude 56° 10′, to Cape Edgecumbe, in latitude 57° 01′, longitude 135° 46′, the distance is sixty-six miles, and the general trend of the coast about north 40° west, indented with numerous bays of large and small extent, and generally bounded by a bold, rocky shore, covered with spruce to the water's edge, and backed by a high mountainous country, very much broken and filled with timber.

RED CAPE.

Fourteen miles, about north 46° west, from Cape Ommaney is Red Cape, the southwest point of a large arm of the sea making six miles into the land northward and having a width of two miles. Three other deep bays, Lisvinitchny, Toporkof,* and Little Strelki,† indent the shore between Cape Ommaney and Red Cape.

PORT BANKS.

Thirteen miles north-northwest from Red Cape is the south point of the three miles wide entrance to Port Banks, with three large arms penetrating the island, one of them nearly crossing to Chatham Strait. The north arm is a continuation of

*Puffin. †Little Arrow.

the main bay, which stretches about north-northeast for nine or ten miles, and in this arm the Russian navigators inform us there is anchorage. Four miles within the entrance along the southeast shore, and one mile before rounding the point opening the two interior arms, Tebenkoff gives a well protected anchorage and deep bay opening towards the north. The soundings in this anchorage are fifteen fathoms.

Tebenkoff calls this bay Whale Bay, but it is the Port Banks of Dixon, who entered it in June 1787. He gives a sketch of it, and the details of the south harbor appear better than those of Tebenkoff. He says, page 193: "On our approaching the land the channel ahead had the appearance of a river from the north, but the tide setting strongly out of it, and the wind shifting to the northward, we stood into a fine harbor which now opened to the southeast. At the entrance we had soundings from fifty to sixty-five fathoms of water over a rocky bottom; but as we advanced further in the soundings lessened to twenty-one fathoms with mud, on which we came to anchor, being completely land-locked and within musket shot of the shore both to the northward and southward." He gives nineteen fathoms at the entrance, which is to the eastward of two small islands abreast the west point; and he has four islets inside, and also a stream not laid down by Tebenkoff. Tebenkoff aptly names this Protection Bay, and the Admiralty Chart No. 2431 calls it Closed Bay. The south point of the entrance from the ocean Dixon calls Point Lauder;* the north point is unnamed.

The geographical position of Point Lauder, according to Dixon and Benzeman, is latitude 56° 33′, longitude 134° 58′; and of the northwest point, latitude 56° 35.0′, longitude 134° 59′. Tebenkoff has a small plan in his chart, but it is evidently only a reconnoissance.

This port should be examined and its capabilities known, as it may afford good refuge and protection to a vessel unable to make Sitka Sound by stress of northwest winds, or heavy southeast weather coming up.

La Pérouse saw the opening of this bay and named it Port Guibert. On his chart its latitude is 56° 38½′. Off Port Banks he saw Mount Edgecumbe, and gives an erroneous view of it from latitude 56° 25′. At the same time he saw Cape Ommaney and Coronation Island, distant forty-three miles.

The north point of Port Banks forms the south point of a broad open bay six or eight miles deep and ten miles across. On some Russian charts it is called Rocky Bay. La Pérouse saw the opening to this bay, named it Port Necker, and gave its latitude as 56° 52½′. The shore runs north for eleven miles, and then west-southwest for six or seven, forming this unnamed bay, with a cluster of large islets near the middle of it, and extending out to the general line of the coast. They are called the Egg Islands, but we find no description of them.

Thence to Biorka Island, the south point of Sitka Sound, the coast is cut by several narrow arms running deeply into the shore, and guarded by great numbers of islets and rocks laid down only in a general manner.

* After the surgeon of his ship.

About three miles before being up with the south point of Biorka Island lies Bare or Goloi Island, while all the surrounding islands are wooded.

SITKA SOUND.

Between Point Woodhouse,* on Biorka Island, and Cape Edgecumbe, lying north 46° west, thirteen miles distant, lies the entrance to Sitka Sound, having a depth of ninety fathoms outside the middle of the entrance, and very bold water in every direction.

Biorka Island is comparatively low and wooded, about two miles in extent, north and south, and the same east and west. It has a sunken rock one mile south of its south point, and several islets, but along its west and north faces the water is thirty fathoms deep close in shore. On the north face of Biorka, one and a half mile east of the northwest point, is a small cove, opening to the northward, with soundings of eleven, nine, and seven fathoms laid down inside the heads. Off the entrance to this cove are soundings in twenty-five fathoms, sandy bottom. The Russian navigators assure us this would make a good pilot station.

Two miles west of the islet which lies off the northwest point of Biorka is a single sunken rock, where a heavy sea breaks only once every five or six minutes. It is said to have ten feet of water on it, and, if so, must be very pointed. The Russian navigators inform me that they have repeatedly watched the break upon it, and that the rocky patch of nearly a mile in extent laid down on the English chart No. 2337, of Sitka Sound, does not exist. It breaks only in one spot, and not oftener than once in five or six minutes.

All the adjacent islands are low and wooded, but the main land is well marked by very high mountains.

Cape Edgecumbe is notedly marked by the extinct volcano of Mount Edgecumbe,† bearing north 52° east, four miles distant from the extremity of the cape. The shores are covered with timber to the edges of the bold high bluffs of rock and lava, fringed with innumerable rocks. The cape presents the appearance of a wooded plateau extending to the base of the mountain, interrupted only by two small hills between the cape and mountain. But the great feature and landmark is the mountain itself, which is peculiarly marked, and has no counterpart in this region. It rises 2,855 feet above the sea, and the top, forming the rim of an ancient crater, appears nearly horizontal, and has a diameter of two thousand feet by Coast Survey measurement. Lisiansky says the basin of the crater is forty fathoms deep.‡ The sides, from the summit down, have a gentle and regular inclination of about twenty-five degrees, are marked by deep furrows, destitute of trees or herbage, and present in sunlight a dull reddish appearance. In winter it is covered with snow. It is situated upon Pitt or Kruzoff Island, of which the south

*Named by Vancouver in 1794. On his chart this name is applied to a position seven miles south of Biorka Island; but this could only be to one of a number of small islands stretching out from the south point of Klutchef Bay.

†Discovered and named Mount San Jacinto in 1775 by Bodega.

‡Admiralty chart, 2,800 feet; Belcher, 3,150 feet; Lisiansky estimated it at 8,000 feet.

and east sides form the north and west shores of Sitka Sound and the passages northward, while its north side forms the south shore of Salisbury or Klokatcheff Sound.

Off Cape Edgecumbe the mountains Crillon and Fairweather, distant one hundred and twenty-five miles to the northwest, are distinctly visible in clear weather. La Pérouse has a view of them from a position near this cape.

From Cape Edgecumbe the north shore inside the entrance to the sound runs a general and nearly straight course of east half north for seven miles to Otmoloi Point, or Point of Shoals, off which, at the distance of a mile, lie the Low Island and rocks, with a passage reported between the point and island. Nearly midway between these points, and one and a half mile off shore, lies the moderately high wooded island of St. Lazara or Cape Island, with from twenty to five fathoms of water between it and the shore. Lisiansky landed in a small bay north-northeast from Cape Island, where the shore was formed of a lava cliff about thirty feet high.

The south shore, inside the entrance to Sitka Sound, is broken by innumerable rocks and low wooded islets, and indented by large bays. The whole shore is covered with spruce, making it difficult to distinguish the islands. No sunken rocks are known to exist nearer the entrance than Williams Bank, five and a half miles north-northeast from the northwest point of Biorka, and lying some distance off the low islands inside. The bank appears to consist of four or five sunken rocks, upon some of which the sea invariably breaks.

Within the entrance the sound contracts its width to six miles between Point of Shoals and Williams Bank, with deep water to and inside that line. From Point of Shoals to Bouranoff Point, forming part of the south shores, the bearing is east by south, the distance seven and a half miles; and on this line the sound is contracted by the Low Island and rocks, one mile distant from Point of Shoals; by the Vitskari and adjacent rocks, three miles distant; by the Kulichoff Rock and adjacent sunken rocks, five miles distant from this same point. Deep channels exist between Low and Vitskari, Vitskari and Kulichoff, and Kulichoff and the islets off Bouranoff Point, with, however, dangerous rocks in the latter. Between Vitskari and Otmoloi, Lisiansky gives soundings in eighteen, seventeen, twenty, and seventeen fathoms.

But the channel invariably used by the Russians is that between Vitskari and Kulichoff. On the English chart this channel is erroneously contracted by the laying down of a sunken reef extending one mile east of Vitskari, nearly on the line towards Kulichoff. In 1809 the Russian naval officers laid down sixty fathoms, two-thirds of a mile from Vitskari, on this very bearing. The captains of the Russian-American Company assure us that they can and have passed Vitskari along its southeast face within half a cable's length when steering a direct course to Mochnati, a course north 62° east, true. We have made it close aboard when coming in at evening, with very thick, heavy weather from the southeast, and saw no breakers to indicate such a reef; in fact, were misled by not finding the

breakers according to the chart. We have also seen it from the south-southeast when there was no breaker off its eastern face, but the breakers on the reef one mile north of it really appeared to be breaking off the eastern face of the rock, and this appearance may have led to the above error. It appeared, from the distance of a mile or two, to be about forty yards long and ten feet above high water, with a rough, irregular surface. In smooth weather it has been landed upon, and the United States Coast Survey has already recommended that a light be placed upon it, as from this point it would illuminate an arc of about 70° of the horizon beyond the sound from southwest by west toward Biorka Island to west toward Cape Edgecumbe, and be a guide to clear the rock off Biorka. From the northwest point of Biorka it bears north 6° east, distant seven miles. From the rock off Biorka it bears north 21° east, distant seven and a half miles.

Kulichoff Rock is laid down on the English chart south by east two miles from Vitskari. It is about twenty feet high, and less in extent than Vitskari. There are sunken rocks to the north and south-southwest of it, about half a mile distant, and one towards Vitskari, about a quarter of a mile off, with deep water and dangerous sunken rocks between the Kulichoff and the islets off Point Bouranoff. But Tebenkoff and the old Russian charts place the Vitskari and Kulichoff three miles apart, while the latest unpublished Russian examinations about Kulichoff place the reef a short distance north of the rock, with a passage of twelve fathoms between them and close to the rock; and one of the Russian navigators assures us he has taken his ship through the passage. The English chart places Kulichoff more than two miles from Bouranoff, but the latest Russian determination makes it only one and a half mile.

On a manuscript Russian map Kulichoff is laid down south 48° west from the governor's house and light, and the ledge about half a mile northward of it.

For four miles inside of Vitskari Rock we find clear, deep water, up to the range of wooded islands and rocks lying for two miles outside of Sitka harbor. Through this barrier of islands there are three channels to the anchorages east and west of the town. These passages are known as the eastern, middle, and western, the former being the longest, and the middle one the shortest, to either anchorage.

The approaches to these passages are free of all known dangers, except towards the eastern. The *Zenobia Rock** has been imperfectly laid down, but the westernmost position assigned to it is one and three-quarters mile northeast, half east from Kulichoff Rock, when the south side of Dolgoi or Long Island will bear north 61° east; and the eastern point of Sandy Island, on the north side of the eastern channel, bears east-northeast, so that a vessel should not bring Sandy Island anything to the north of that bearing. The Zenobia has fifteen feet upon it at low water. One-quarter of a mile eastward of it, on the same bearing to Dolgoi Island, is the Kadin Rock with twelve feet. It is a sharp-pointed bayonet rock, of very limited extent, and has from ten to seventeen fathoms close to it.

* Named after the American ship Zenobia, which struck upon it about 1855.

When vessels are in the eastern channel they must keep at least one-third of a mile south of the island, on the north side of the channel, until the governor's house bears west of north by west one-half west, when the island may be safely approached within two hundred yards.

In approaching the islands lying off Sitka in thick weather, the officers of the company endeavored to find the Island of Mochnati, which is from twenty to thirty feet high, rocky, and covered with a thick growth of spruce, whose dark foliage, with the black rocks beneath, brought out in relief by the surf breaking along its front and on the outlying rock, makes it discernible through the fog when other islands are invisible. This islet lies between the middle and western channels, five miles northeast by east half east from Vitskari, and a vessel making it can take either, and safely run for the anchorage. When the fog is lifting, from the coming in of a westerly wind, this island appears first. Abreast of Mochnati the western channel is about three-quarters of a mile wide, with a large reef, bare at low water, forming the western side; and the middle channel is contracted by sunken and exposed rocks to a much narrower entrance.

The English chart, based upon the Russian survey of 1809, gives a good general idea of the channels and the anchorages, which should only be entered under the guidance of a pilot, or with good local knowledge.

The results of the preliminary survey of the two harbors by the United States Coast Survey show that the base line of the original survey was erroneous, and this may possibly explain the announcement on the English chart that "there are discrepancies between this chart and the plan of Sitka (2348) which cannot be adjusted."

The *harbor of Sitka* is very contracted, and, in the western anchorage, numerous mooring buoys have been laid down by the Russian-American Company near the town, although this part of the harbor is narrow and marked by three sunken rocks. The eastern harbor receives the greater sweep of the southeasters, and a heavy swell is said to be brought in from the sound, so that the company's vessels prefer to anchor in the western, as they can discharge more readily, and especially because during the winter the officers and crews are taken from the ships, which are left with only one keeper. The British men-of-war use the eastern harbor.

In the great gale of October 28, 1867—the severest at this place for very many years—three or four vessels broke adrift from their moorings and several were driven ashore. The steamship John L. Stephens dragged her anchor, but having steam up and getting her anchor, steamed through the throat connecting the two anchorages, and anchored in nine fathoms in the eastern harbor, where she rode out the gale easily, and afterwards experienced great difficulty in getting her anchor, so firm a hold had it taken in the tenacious bottom of mud and shell. The Stephens is an old Panama steamer of twenty-five hundred tons burden, very high out of water, and had but one anchor, of two thousand pounds.

The captain of the Stephens pronounces the bottom capital holding ground, whereas the Russians have claimed that it is gravel with only a covering of mud, and that a vessel lies uneasily; but the Stephens discharged the remainder of rhe freight from this anchorage.

As the eastern harbor is larger than the western, free of sunken rocks, and easier of access, the adoption of it as the better anchorage for large vessels is confidently recommended.

The geographical position of the Coast Survey astronomical station, between the new United States barracks and the church, is in latitude 57° 02′ 52″ north, and in longitude 135° 17′ 45″, or 9*h*. 01*m*. 11*s*.

The magnetic variation determined by the Coast Survey near the Russian observatory on Japonski Island was 28° 49′ east, in August, 1867.

It is proper to observe that in the Russian survey of 1809 the latitude of Sitka was given as 57° 03′, and the longitude 135° 18′.

Light at Sitka.—From the cupola of the governor's house a light was shown to vessels entering the sound at night to enable them to reach an anchorage. It is one hundred and ten feet above the sea, and was exhibited (1867) when two guns were fired. It shows over all the islands southwest of the anchorages.

Tides at Sitka.—From the Coast Survey tidal observations of two months, from August 21 to October 21, the mean rise and fall of the tide is 7.8 feet, and at the full and change of the moon 11.9 feet. The extreme range observed during the above period was 13 feet, and the least range 2.1 feet. The Russian charts and authorities give the rise and fall between 14 and 15 feet, and this has been the accepted fact; but the English chart states: "H. W. F. and C. 0*h*. 34*m*.; spring rise 5 to 7 feet," and discredits the Russian results. The determinations of the Coast Survey give, therefore, an important correction to established opinions and authorities upon this subject.

The following table enables a prediction to be made, for any required date, of the time and height of high or low water under ordinary circumstances of wind and weather:

The two tides of the same day are generally unequal in proportion to the moon's declination. The time and height can be obtained approximately from the following table:

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	12 08	9.5	19 13	—0.2	13 26	7.5	18 35	4.1
Zero	12 38	9.3	18 46	1.0	12 38	9.3	18 46	1.0
Greatest south	13 26	7.5	18 35	4.1	12 08	9.5	19 13	—0.2

The interval is to be added to the time of the moon's meridian passage for the date required, to give the time of high or low water. The time of the moon's upper meridian passage is given in the Almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters, to which level the soundings on the chart are given.

Spring tides.—At the full and change of the moon the high waters will be one and one-tenth feet higher than the above, and the low water one and one-tenth foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be one and one-tenth feet lower, and the low waters will not fall as low as one and one-tenth feet.

Sitka was the principal establishment of the Russian-American Company, and comprises about one hundred and twenty good block-houses, storehouses, barracks, workshops, saw-mills, churches, hospital, and the governor's headquarters. On January 1, 1867, it contained nine hundred and sixty-eight inhabitants, of which three hundred and forty-nine are Russians, and the remainder creoles or half-breeds and Aleutians. Outside the stockade are forty large Indian houses, facing the western harbor, and occupied by not less than one thousand Koloshes during the winter. The site of the town is cramped, and it is a mere question of time and expansion when these Indian houses will be removed. For years the Russians have had about a dozen guns directed along the face of the Koloshian village.

It would be useless to attempt to describe the labyrinth of channels and islets passing in every direction, like tentacula, from the sound, yet a few items may not be without interest.

About nine miles south three-quarters east from Sitka (but thirteen miles by the usual courses) are the rapids, connecting the waters of Deep Lake with the southeast part of Oserski Bay. At these rapids, having a fall of nine feet, a series of fish weirs have been constructed by the Russian Company in a very substantial manner, from shore to shore, and great quantities of salmon are caught and cured. In 1867, besides furnishing Sitka, the produce was five hundred and twenty barrels, and there is ample opportunity to increase this catch fivefold.

A good passage exists between the north part of the sound and the eastern end of Salisbury Sound, which enters from the Gulf of Alaska, in latitude 58° 20′, and continues through Peril Straits to Chatham Straits. The Coast Survey has made several preliminary examinations through these waters, and changed materially their shapes on the English chart. But they should not be run without a pilot of good local knowledge.

The Neva Passage, leading from the north entrance of Olga Strait to Peril Strait, is quite narrow, and has numerous sunken rocks along its shores. The Coast Survey made a preliminary examination of it which indicated plenty of water,

but made the passage narrower than laid down on the charts. With a thorough survey of this strait and of Salisbury Sound, with its bold approaches, another entrance is afforded to Sitka Sound to vessels driven north of Cape Edgecumbe by heavy southeasters or by the currents in light airs.

A vessel once inside Sitka Sound and unable to reach the anchorage, on account of heavy southeast weather, will find two small bays and anchorage about ten miles to the north-northeast of Low Point, and north of Vitskari. The first is *Port Krestov (Cross,)* in Cross Bay, and is reached by following the western shore of the sound about a mile distant, gradually approaching it to within half a mile, about seven miles from Low Point, when Rocky Point will be on the west, and Guide Island, high and wooded but erroneously marked as a rock awash on Admiralty Chart No. 2337, will bear east; and land to the west of north will apparently close all progress. This is the entrance to Cross Bay, and Port Krestov lies to the westward of the first point on the west. This point lies about southwest by south from the opposite point of the port, and a channel leads along the western side of it to a large sound northward. Round the southwestern point pretty close and run westward half a mile, when anchorage may be had in ten fathoms. This part of the port is half a mile wide, north and south, diminishes to a very narrow channel, with six fathoms, in three-quarters of a mile, and then opens through a very narrow, crooked channel to the northward. Tebenkoff gives a small plan of this port in his chart. The other bay is wide open to the eastward, and its south point lies one mile to the north-northeast, with a rock one-third of a mile south of the point. In the middle of the bay lies a small woody island. It may be passed on either hand and anchorage found in the head of the bay in twenty fathoms. Half a mile east of this island is a rock showing ten feet above high water, but marked sunken on Admiralty Chart No. 2337. In a southeaster there is a large swell coming into the bay.

In 1787 Dixon anchored in eight fathoms, sandy bottom, one mile north of Otmeloi or Shoals Point, which he named White's Point, being somewhat protected by a rocky reef off the point. Close on the eastern face of the reef he gives soundings in sixteen fathoms; from this anchorage Mount Edgecumbe bore west by south (compass.) He determined the latitude 57° 03′; it is in 57° 01′.5.

Sitka Sound was fairly represented by Vancouver, who named it Norfolk Sound in 1794, but he did not enter it. La Pérouse had very vaguely indicated the existence of a bay here, but its head was obscured by a fog. He applied no name to it. In 1775 Quadra named it the Bay of Terrors, and named the north point Cape Enganno. Tebenkoff describes its appearance as terrible in heavy southeast weather; but it is neither better nor worse than any other large, open sound.

ST. JOHN'S BAY.

Near the northern end of the Neva Strait, seventeen miles from Sitka by the straits, this harbor opens to the westward, and directly towards Salisbury Sound, of which it may really be considered the termination.

The bay is about a mile and a half deep towards the east-southeast, and half a mile wide; it has good anchorage near the head in sixteen fathoms of water. The shores are bold and rise to mountains covered with spruce to the water's edge. The stream at the head comes into the bay through a narrow low valley between high mountains. We anchored here in October 1867, and discovered specimens of good coal.

From Cape Edgecumbe the general trend of the coast to Cape Phipps, in latitude 59° 30′, longitude 139° 42′, forming the southeast point of the entrance to Behring or Yakutat Bay, is about north 40° west, and the distance one hundred and ninety miles, with the greatest deviation from this course at the entrance to Icy Strait, whose north point is twenty-six miles northeast from the above course.

From Cape Edgecumbe the general trend to Cape Fairweather, in latitude 58° 50′.2, longitude 137° 48′, is north 30° west to Icy Strait, lying fifteen miles northeast from this line.

From Cape Edgecumbe to Letúya Bay, twenty-three miles southeast of Fairweather Cape, the coast is bold, rugged, and rocky, bounded by great numbers of rocks, and indented by numerous small bays and the large entrance to Chatham Strait.

From Cape Edgecumbe to the island forming the new point of the entrance to Salisbury Sound the direction is north, and distance twenty miles.

MARY BAY.

Between Capes Edgecumbe and Georgiana, seventeen miles north, the shore is deeply indented by a large open bay named by Vancouver, but never entered by him. One of the Russian captains informed us that he was compelled to anchor in the southern part of it for three days, during heavy southeast and southwest gales, at great hazard. On some of the Russian charts it is called Shelikoff Bay, and the south point named Beaver Point. A crude sketch is given of it on Russian chart No. 9, 1848. From this bay there is a trail to the sound north of Krestoff Harbor.

SALISBURY OR KLOKATCHEF STRAIT.

The entrance to this strait from the Pacific lies between latitude 57° 18′ and 57° 22′, and through Peril Strait it opens in Chatham Strait, in latitude 58° 25′.

The south point, named Cape Georgiana by Portlock, is narrow, comparatively high, and wooded, with the Morskoi or Sea Rock lying one mile north 63° west from it, with twenty-seven fathoms between them. The north point,* lying north half west from the south point, is an island named Klokatchef, and appeared from the inside of the strait to be about two hundred and fifty feet high, and covered with spruce trees, with high mountains lying to the northeast.

* Named Point Olga by the United States Coast Survey. On some Russian charts it is called Klokatchef Cape.

These mountains are covered with wood half-way up, but bare and rocky at their summits.

The strait runs directly east five miles, contracting at its narrowest place to one mile between the rocks off the north and south shores. It opens into Fishing Bay and Peril Straits at the northeast, and into Hayward * Strait and St. John's Bay at the southeast. Off the north shore the rocky islets extend half a mile, the southernmost lying three and a half miles inside the entrance, and are low and bare. Nearly abreast of them, off the south shore, lies the low, wooded island of Sinitsin, with rocks off its north point, and fourteen fathoms close to them.

Between Cape Georgiana and Sinitsin Island a small bay, named Kalinina, half a mile wide at the entrance, makes in to the southeast, and then to the southwest for a mile and a half, and said to afford good shelter in seven fathoms of water well in. But from its position it is probable that the heavy swell of southeast and southwest gales would be felt. On its eastern side a wooded mountain about fifteen hundred feet high rises very abruptly. Tebenkoff gives a plan of the western entrance to Salisbury with this bay and its soundings. He has ninety-three fathoms outside, and anchorage in fifteen fathoms southwest from the northeast point.

Sinitsin Island nearly touches the southern shore of the sound, and rocks are laid down between them. To the southeast of this island the shore is laid down straight on the maps, but from our position in the middle of the sound the shore appeared to retreat well to the south, heading in a low valley, with the high mountain that flanks Kalinina Bay to the west, and a wooded hill of about six hundred feet high on the east. Two rocks appeared in the entrance of this apparent bay, yet it might afford a good harbor of refuge.

In the middle of the eastern part of the strait we found fifty-five fathoms of water.

This strait is the Bay of Islands of Cook, the Salisbury Sound of Portlock, whose boats in 1787 passed through it and by the Hayward Strait † to the north part of Sitka Sound. It is called Olga Strait by Tebenkoff.

Cape Georgiana was subsequently named Point Amelia by Vancouver, but on his chart the name is applied to a point four or five miles further south. On the Admiralty Chart No. 2337 it is designated Siouchi Point.

PERIL STRAIT.

This strait, leading from the northeast part of Salisbury Strait to Chatham Strait, has a tortuous channel, with a general north-northeast direction for ten miles, with an average width of three-quarters of a mile. A mile and a half from Salisbury Strait it opens into a great bay, Fish Bay, stretching five miles to the eastward, with width of two miles. Under the north shore of Fish Bay, about

* Only affords passage for boats at southern end.
† Named Soukoi on Admiralty Chart No. 2337. (i.e. Dry Bay)

two miles east of the northwest point, a small bay makes in towards the north, and anchorage is to be had there in ten fathoms. It is used by the Russian vessels. On the west shore two large bays open, the first directly opposite the northwest point of Fish Bay, off which lie some islets that must be left to the eastward. Two miles northeastward of this island, another lies close under the eastern shore. Anchorage is had between the south side of this island and the shore in thirteen fathoms. It is used by the Russian vessels. The navigation of this strait, until better known, should be made under the direction of a pilot, and at or near slack-water low-tide, as there are several narrow places where the currents and counter-currents are very strong and dangerous to a side-wheel steamer.

From the northern side of Peril Strait, about mid-way through, an unexplored passage is reported to exist, leading northward to the south shores of Cross Sound in Icy Strait.

Near the eastern entrance of Peril Strait, on the northern shore, there is a small bay formed on the west side of a point jutting out nearly half a mile. It is about five miles west of the northeastern entrance, is named Lindenberg Bay, and is used by the Russian vessels. In 1867 a couple of small, rude houses were on the shore behind the sandy beach. The country behind is very high and covered with timber.

From the north point of Salisbury Strait to Cape Edward, in latitude 57° 39′, longitude 136° 14′, the general trend of the coast is north 40° west, and the distance twenty-four miles, with a slightly retreating shore of bold cliffs wooded to their edge, and innumerable rocks.

KHAZ BAY.

Six miles northward of Salisbury Strait, Tebenkoff has a bay called Khaz, entering the land about three miles eastward, but has rocks marked in the entrance. We find no details or information about it.

From Salisbury Sound to Icy Strait the coast is bordered by low wooded islands, among which, Portlock says, there appear several places of good shelter. The mountains rising almost directly from the coast are quite high and irregular, some well wooded and others quite bare.

CAPE EDWARD.

Between Khaz Bay and this cape the bold coast line recedes a few miles, but the general direction is maintained by the great number of outlying islands; to this bend of the shore Tebenkoff has given the designation Bay of Islands.

Vancouver says that off Cape Edward lies a cluster of small islets and rocks. Tebenkoff has the islets and rocks, and lays the cape down as broad, extending two miles north and south, bold, high, and rocky.

Seven miles to the north-northwest of the cape, and almost on the line to

Cross Cape, Tebenkoff lays down some rocks or islets three miles off the coast and two miles from the nearest islets.

The south point of the cape is placed in latitude 58° 39′, and longitude 136° 14′.

From Cape Edward to Cape Spencer, in latitude 58°, longitude 136° 34′ forming the northwest point of the entrance to Icy Strait, the general direction of the coast is north 16° west, and the distance thirty-four miles, passing tangent to Cape Cross, in latitude 57° 56′.

ILINA HARBOR.

This is a small contracted bay, of which we find a published chart by the pilot Ilina, but without date. It is not indicated on Tebenkoff, but on another Russian chart its entrance is laid down about two miles east-northeast of the island, lying seven miles north-northwest of Cape Edward. From its smallness, and being open to the south, it would appear of no importance. Ilina places its southeast point of entrance in latitude 57° 46′, longitude 136° 16′, with islets lying three-quarters of a mile south of it. The northwest point of entrance lies northwest by north half a mile from the southeast point, with islets half a mile southwest by south from it. He has one line of soundings from twelve fathoms at the approaches, and running close along the eastern shore, with eight fathoms, between it and the first small islet inside the point, over a bottom of mud, sand, and muscle shells. His anchorage is in the northeast part of the bay, in eight fathoms, but an islet on the western shore has a sunken rock to the northeast. A narrow arm of the bay continues north-northeast, with ten fathoms at the entrance. In the shore an intricacy of small channels in the northeast is marked by Koloshian habitations.

A quarter of a mile east of the southeast point of entrance is marked the wreck of a tender.

PORTLOCK HARBOR.*

This large bay has been fully described by Portlock, but his sketch of it is merely a rough estimate, and he makes no mention of determining its latitude, although his map places his anchorage inside the north entrance in latitude 57° 49′, and Vancouver says that about six miles north of Cape Edward the harbor that appeared of easiest access was considered Portlock. Harbor, in latitude 57° 44′, but the weather was thick, foggy, and rainy, and the shores not well seen.

Portlock says: "On drawing near the opening, and about two miles from the shore to the northwest of it, we had twenty to twenty-five fathoms of water over a muddy bottom, and just in the entrance were some high, barren rocks."

The following is the best description that can be drawn from Portlock's sketch and text: The opening to Portlock Harbor lies between two points lying northwest and southeast from each other and distant from three to four miles

*Named by Portlock 1787.

apart. This entrance is, however, divided into three passages by two large, bluff, wooded islands lying directly between the points. The southeast island received the name of Hogan, and that to the northwest, Hill.* The south passage is about half a mile wide, with bold shores and twenty fathoms of water. The middle passage is a mile wide at the outer part, but at the inner part is contracted to half a mile, with ten fathoms of water, by two bare islets and rocks from the southeast point of Hill Island. The northern passage is narrow, and no soundings are given. Rocks lie off the southeast point of the bay, off the south point of Hogan Island, and bare, rocky islets and rocks off the northwest point of Hogan Island. The south side of Hill Island is "low land, forming itself into several small bays, from whose points are breakers at no great distance," with bold rocks extending nearly half a mile off the southeast point.

The deepest water in the middle passage between Hill and Hogan Islands is forty-six fathoms over rocky bottom; the length of this passage is about a mile; has bold, rocky shores, and the course through it is nearly northeast by east. From the sketch, the best course in would be to steer east-northeast for a wooded islet inside, and lying half a mile north-northeast from the north point and islet off Hogan Island; between this wooded islet and Hogan Island a depth of thirty-two fathoms is given. The southeast passage is about a mile in length.

Immediately upon passing the bold rocks off the southeast point of Hill Island, the water deepens very quickly to thirty and forty fathoms, and a most spacious and excellent harbor opens to view, trending to the northwest and southeast, and running deep into the northward, with a number of small islands scattered about. Running up towards the northwest part of the harbor, and after passing the small island close to the north side of the northeast point of Hill Island, Portlock anchored in thirty-one fathoms of water, muddy bottom; the rocks off the east part of Hill Island being just shut in by the small island, and bearing south three or four miles. (According to the sketch they bore about south-southeast, distant one mile.)

The country adjacent to Portlock Harbor abounds with white cedar, which was cut and sawed into sheathing-boards. This is evidently the yellow cedar of Alaska.

Tebenkoff's chart gives no idea of a deep bay in this locality, although he has the name in latitude 57° 45′.

Goulding Harbor.—The entrance to this harbor is nearly abreast of the north entrance to Portlock Harbor and about one and a half mile north of his anchorage in the latter. It is represented as nearly half a mile wide, but nearly closed by a wooded island running close to the southwest point of the peninsula between Goulding and Portlock Harbors, with six fathoms in the channel around the west end of the island. The harbor runs about four or five miles to the northeast, with a width of about a mile, and two broad arms running to the northwest. It has numerous small wooded islets in it, and a depth of six fathoms may be carried

* Named after Portlock's assistant trader.

most of the way up. The sketch is very evidently an eye sketch, and the view very crude and erroneous, for it represents palm trees growing on the shores.

In latitude 58° 51′ Portlock has a bay three miles deep east-northeast, with two islets off the northwest point, and others a mile or two south of the southeast point.

POINT BINGHAM.

This rocky headland, in latitude 58° 03′, longitude 136° 27′, forms the southwest point of the entrance to Icy Strait, and lies south 16° east, eleven miles from Cape Spencer. Between it and Cape Edward the coast is bold and rocky, guarded by islands, indented by two bays three or four miles deep, and by a broad entrance to Icy Strait, ten miles south of Point Bingham and six miles south of Cape Cross.

The bays were judged by Portlock to afford good shelter, but the vast number of wooded and bare islands and rock that extend to the distance of three or four miles from the shore, will render entering such harbors unpleasant and hazardous until better known and described.

Cross Cape, of Cook, lies in latitude 57° 57′, six miles south of Point Bingham, and is in reality the western point of Jacob or Khaz Island, around the south and east faces of which a strait one mile wide connects Icy Strait with the ocean near Portlock Harbor. At the southeast part of the cape a bay one mile wide and three deep is laid down by Tebenkoff in an east-northeast direction. Cook says the southeast point of Cross Sound is a high promontory which was named Cross Cape. Point Bingham was named by Vancouver in 1794; by the Russians it is sometimes called Cape Takhanis.

The entrance is eleven miles wide between Cape Spencer on the north and Point Bingham on the south, bearing south 16° east from the former.

Vancouver describes Cape Spencer as a conspicuous, high, bluff promontory, off which extend some rocks to the distance of a mile and a half. It is long and terminates in a narrow point, with the outer-shore stretching nearly northwest, and the inner shore north. The cape is placed in latitude 58° 13′.4, longitude 136° 34′, by Tebenkoff. Point Bingham is not described, but its rounding point is a rocky bluff with small islets along its face, and the height decreasing eastward. The point is placed in latitude 58° 03′, longitude 136° 27′.5, according to Tebenkoff.

The entrance to this strait is wide, open, and unobstructed by rock, shoal, or island. This appears to be the case for ten miles within the heads, and Vancouver says that, if it possesses any navigable objection, it is the unfathomable depth of water which everywhere exists except very near the shores, along which in many places are detached rocks, lying, however, out of the way of navigation, and sufficiently conspicuous to be avoided. Inside of Cape Spencer the strait expands into a great bay running fifteen miles north-northwest, and from ten to four miles wide. Six miles inside of Point Bingham a passage two miles wide opens to the south-southeast and runs ten miles in that direction, when it turns abruptly to

the west-southwest, and reaches the ocean in about six or eight miles, in latitude 57° 53′, four miles southwest of Cape Cross, where Portlock noted the "appearance of a harbor" in 1786. This passage has been named Little Cross Strait by the United States Coast Survey.

Cross Sound has been named Icy Strait by the Russians, and appears to well deserve the appellation. Tebenkoff says that ice is found there all the year, impeding navigation; and in July and August Vancouver's officers found part of the passage almost closed with the ice. Frequently the masses of ice are detached from the face of the glaciers, covered with gravel and earth, and these drifting in the sound are often taken for rocks awash. Vancouver mistook them and found no soundings with eighty to ninety fathoms. Upon the Russian chart are marked the positions of the different glaciers that come down from the terminal spur of the Mount Elias and Fairweather range to the heads of the bays opening upon the north shore of the strait.

The general direction of the strait is about northeast by east quarter east for thirty miles, then southeast by east for twenty-four miles to Chatham Strait. Cape Spencer is sometimes called Cape Tsianikhta. The first anchorage inside the sound is on the south shore, about four or five miles eastward of Point Bingham, and one mile west of the north entrance of Little Cross Strait. It is evidently very contracted, and no soundings are laid down, although the track of the trading vessels is laid down to it.

PORT ALTHORP.

Vancouver has given a sketch of this bay, the entrance to which is situated on the south shore of Icy Strait, ten or eleven miles northeast quarter north from Point Bingham, and ten miles east by south from Cape Spencer. The entrance to the bay, opening from the sound, lies between two islands north and south of each other, and is bordered by a number of rocks and islets. It has nine fathoms of water in it, over rocky bottom, with thirty and forty fathoms around this ledge. "The channel is clear, free from danger, and is one and a quarter mile in width, with a tolerably snug cove, just within the entrance and off the south face of the western part of the island, that forms the north point of entrance." Here Vancouver anchored in fourteen fathoms, a cable's length from shore. Tebenkoff puts the anchorage down in ten fathoms, sandy bottom. "This high narrow island affords great protection to the bay, which is two and a half miles wide just inside. Nearly in the middle of the bay, and one league southeast by south from the anchorage, are some detached rocks. The island forming the south point of entrance is about two miles long, and stretches to the south-southeast toward Point Lucan, from which it is separated one mile, but the space is filled with numerous islets." "At Point Lucan, which is situated from the anchorage south 23° east four and a half miles, the width of the harbor is two miles, from whence it extends south 36° east about six miles, and terminates in a small basin

that affords good and secure anchorage, the best passage into which is on the eastern shore; rocks and an islet guarding the west." Vancouver gives the latitude of his anchorage 58° 12′; Tebenkoff gives the longitude 136° 12′.

The surrounding country is covered with spruce trees.

ISLANDS IN ICY STRAIT.

The islands that lie north-northeast from Port Althorp contract the middle of the strait very much, and almost close the passage to the east. The group consists of one low and two high rocky islands, with some rocks and islets among them. Between these islands and the shores that form the north and south sides of the sound there are two narrow channels; the northernmost, being the widest, is nearly a mile across; the southernmost is about half that width; both of which are free from rocks and shoals or any other obstructions than the large masses of floating ice which at that time of the year (July) rendered each of these channels very dangerous to navigate. The track of the Russian steamers is laid down through the southern passage, keeping the south point of the island close aboard. After passing it two or three miles the course is about east by north half north for fourteen miles to Point Adolphus, on the south shore, with a deeply indented bay to the southward. Nine miles southeast from Point Adolphus is the two-mile-wide entrance to Port Frederick of Vancouver, being the north entrance to two unexplored passages. The western one is said to lead nearly south to the northern bend of Peril Strait, and the other southeast thirty miles to Chatham Strait, opening just south of Paoloff Bay, and possibly communicates with it. In the entrance to Port Frederick, which opens directly to the north, lie two or three large islets off the western shore, with deep passage on the western side of the northern island. The anchorage of the English and Russian trading steamers is on the east side of the entrance, about three miles south of the northern point, and between the eastern shore and the first island under it. No soundings are laid down.

The northeast point of the entrance to this port was named Point Sophia by Vancouver. It has a high hill to the southward for two miles, and then a low neck of land. From Point Sophia to Point Augusta, forming the southeast point of the entrance into Chatham Strait, the general trend of the shore is southeast by east third east for seventeen miles, and is composed chiefly of rocky cliffs, with islets and detached rocks lying at some distance from the shore, which was compact, not very high, but well covered with wood.

SPASKA BAY.

Five miles west-northwest from Point Augusta the Russian traders have an anchorage laid down in Spaska Bay. The extreme northwest point is two miles north of the entrance of the bay, which runs west-southwest about one mile, with thirty-five fathoms in mid-entrance, diminishing to four over a level bottom half

way up the bay. The Russians anchor in a very small cove just within the southeast point of entrance, in four fathoms water. The latitude of this point is given by Tebenkoff as 58° 06′, and longitude 135° 08′. A sketch is given on the Russian map No. 20.

On some Russian charts, and on Admiralty Chart No. 2431, this harbor is laid down on the west side of the first prominent point seen westward from Point Augusta; on Tebenkoff it is on the east side of that point.

OCEAN COAST NORTHWARD OF CAPE SPENCER.

For twenty miles north of Cape Spencer, Vancouver says the coast is composed of a steep, woody shore, much indented with coves or bays, of a hilly, uneven surface, with some rocks and rocky islets scattered along it about a mile distant.

ICY CAPE.

Fifteen miles northwest from Cape Spencer is Icy Cape, having a small open bay on the eastern side, making in a mile or two northward, and distinguished by having the first sea-coast glacier at the northeast side of it. A small island lies well up in the bay, and Tebenkoff has one nearly a mile south of the cape.

La Pérouse indicates this bay on his map; but hence southward to Cape Edgecumbe his shore and positions are very erroneous. The shores to the northwest and southeast are bold and rocky and wooded.

LITÚYA BAY.

Thirty-two miles northwest from Cape Spencer is the narrow and dangerous opening to this bay, which has a certain importance as being the only place which La Pérouse examined in detail, and which he pronounced the most extraordinary place in the world, and where he lost two boats and twenty-three men of his expedition.

Seven miles west of the entrance he found soundings in thirty-two fathoms muddy bottom. This bay presents the appearance of a great fissure in the elevated plateau of this reach of the coast, about a mile wide at the entrance and two miles inside, running six or seven miles inland north 40° east, and then opening into two large arms at right angles to the former course. The eastern arm is one mile wide, and four miles long south 73° east; the western one about the same width, four miles long north 52° west, with soundings in both indicating great depth, but the eastern arm has less depth.

The two points of the entrance from the ocean lie only five-eighths of a mile from each other upon the bearing north 65° west; but the available passsage is contracted by a great rocky reef stretching nearly five-eighths of a mile south 40° east from the western point, and nearly on a line with the outer rocky shore to the westward. Rocks also lie off the eastern point for a quarter of a mile; and

the *Eastern Rock*, not always visible, lies three-eighths of a mile south of the east point, and a quarter of a mile south 60° east from the southeastern extremity of the reef making out from the west point. Inside the eastern rock is *Cormorant Rock*, at the narrowest part of the passage, which is here only three hundred yards wide. La Pérouse's boats sounded across the entrance for two hours, and found seven and eight fathoms of water in the middle of the passage, and five fathoms within forty yards of the rocks on either side; inside they reported ten and twelve fathoms, with good bottom, with the water very smooth, while the reefs were covered with breakers.

The course in, according to the map, is north by west, keeping close to the eastern end of the western reef, and running close along its eastern face with flood current to a small cove one mile from the passage, close under the western rocky point, where the best anchorage is found in five and six fathoms, over sandy bottom, where the point will bear east of south. From this cove a trail leads two or three miles to a large Indian salmon fishery, at the mouth of Salmon River, where the shore changes from rocky bluff to sandy beach westward.

Just inside the eastern point of the entrance is a small bight, with the summer habitations of the natives on the beach, and a small stream emptying hrough it. La Pérouse, losing the wind after entering, and having a strong ebb current, anchored off this bight, and found six fathoms, over sandy bottom, where the entrance bore south-southeast. It is prudent to enter only near slack-water, low tide, with a sailing vessel; or slack-water at either tide with steamer. Anchorage may also be had under the western shore, a mile and a half directly north from the entrance, and where the bay begins to expand, with depth of water fifteen fathoms, over muddy bottom, a quarter of a mile from shore, with an Indian house at the mouth of a stream bearing west-southwest.

La Pérouse says that at full and change it is high water at 1*h.* 00*m.*, and the tide at Cenotaph Island rises seven and a half feet.

The geographical position of the Cormorant Rock, reduced from D'Agelet's position on Cenotaph Island, is latitude 58° 36′ 36″, longitude, by Lipinski 137° 16′; that by D'Agelet was 137° 27′. The magnetic variation in 1786 was 28° east; and Lipinski made it 25° east in 1826.

In Shiltz's report to Baranoff, (July 1796,) he says: "The entrance to Litúya Bay is most dangerous; the strong currents, rushing over hidden rocks, occasion rapids which almost entirely conceal the channel, and thus add to the danger. In fair weather my vessel was being towed in, when the water before me appeared one and a half fathoms higher than in the bay, and we shot the descent with irresistible speed and great danger. Once inside, all immediate danger ceased. The bay is large and filled with rocks and sands; no wood at the immediate entrance, and no position fit for a settlement. The bay is destitute of fish, except halibut, which abound only in spring and summer. In the winter the bay abounds in sea lions, *(phoca jubata,)* but the common seal *(phoca vitulina)* is very seldom seen."

Other navigators pronounce the entrance dangerous. The shores a short distance inside the entrance are described as "composed of enormous cliffs eight and nine hundred feet high, overhanging fathomless waters; the glacier ice, forced from the mountain gorges, covers the surface of the water all the year round. No sound but the fall of great masses of ice disturbs the silence of this terribly grand but gloomy gorge."

There is no doubt of the entrance being dangerous at certain stages of the tide; but the fact of La Pérouse's boats examining the passage for two hours; of the Indians constantly entering and leaving it, "whole villages at every tide," prove that it may be entered with safety; and even when two of La Pérouse's boats were lost, the jolly-boat passed through the breakers stern first without damage. With a sailing vessel the great trouble arises from the calms that prevail inside. La Pérouse was five days moving his vessel a couple of miles.

For about a mile and a half inside the entrance the width is only three-quarters of a mile, when it expands by the retreat of the eastern shore to a mile and a half in width, and *Cenotaph Island** lies nearly in the middle, about two and three-quarter miles from the entrance. This island, covered with wood, lies northwest half west and southeast half east, three-quarters of a mile long and over a quarter broad. There is a hill at each end; rocky shore to the east and low at the west, with a slightly curved bight on the southwest face, which is rocky, but bordered by sand beach. The west end is out three-eighths of a mile from the west shore of the bay, with thirty-five fathoms water. La Pérouse anchored in thirteen fathoms, muddy bottom, with the middle of the island bearing southeast.

La Pérouse reports: The forests along the coast for seven or eight miles to the eastward abound in great spruce trees that measured six feet in diameter, and were estimated upwards of one hundred and forty feet high.

The sides of the harbor are formed by secondary mountains, of great height, (five thousand one hundred to five thousand seven hundred feet,) and covered with pines, carpeted with verdure, and merely capped with snow; several species of grass; woods full of blackberries, raspberries, strawberries, &c. Vegetation for three or four months is very vigorous. Rivers abound in salmon and trout, but in the bay they caught nothing but halibut, some over one hundred pounds; muscles in heaps. Bears, martens, and squirrels in the mountains.

He says the iron daggers of the natives were "as soft and easy to cut as lead," and that they knew how to forge iron, fashion copper, &c., although he cannot admit they are acquainted with the method of reducing iron from the ore.

Two great glaciers enter the ends of the eastern and western arms, and two smaller ones come from the north face nearly opposite the main bay, and he doubts whether the profound valleys of the Alps and Pyrenees exhibit a picture equally terrific, and at the same time so picturesque.

* Named in 1786 by La Pérouse, who erected a monument thereon to commemorate the loss of his men.

He applied the name Port des Français to this bay. Litúya is the native name, according to Tebenkoff, and by this it is known on the coast. Another Russian chart calls it Alituya, but La Pérouse says the natives call it Skecter. The Russian Company had their vessels many times in this bay before La Pérouse, and contemplated establishing a post here, until Khromtchenko and Lipinski reported adversely.

The great snow peak of *Mount Crillon** is placed about seventeen miles east-northeast from the entrance of Litúya Bay, but Tebenkoff places it only twelve miles east by north from the entrance, and only five miles north of the west arm. No height has been assigned to it, but it is visible, with Fairweather, off Cape Edgecumbe, and appears at that distance slightly higher, so that it must be nearly of the same elevation as Mount Fairweather. La Pérouse says it would be easy to mistake Mount Crillon for Mount Fairweather, but the latter appears, from every point of view, accompanied by two less lofty mountains, while the former is more isolated, and the summit inclines to the south.

Lipinski places Mount Crillon (Litúya Peak of the natives) in latitude 58° 38′.5, longitude 137° 11′.5, and only eight miles from the coast. About two or three miles north-northwest of Litúya Bay is the mouth of a stream with a lagoon at its mouth, and having its head in a mountain lake, to which the salmon ascend in great numbers at the proper season. A large Indian fishery was formerly established here, and a road leads along the rocky coast to Litúya Bay.

CAPE FAIRWEATHER.

From Litúya Bay to this cape the distance is twenty-two miles northwest; the immediate shores low and sandy, with a five-mile margin of low ground covered with trees, running a few miles to the foot of the snow range of Mount Fairweather, and only broken by the River Katagini, nine miles from Litúya.

It is situated in latitude 58° 50′.2 and longitude 137° 48′, according to Lipinski. Vancouver says: "This cape cannot be considered a very conspicuous promontory; it is most distinguishable when seen from the southward, as the land to the west of it retires a few miles back to the northward, and there forms a bend in the coast; it is the most conspicuous point we noticed eastward of Cape Phipps. It is terminated by a low bluff cliff on a sandy beach, near which are a few detached rocks."

Seven miles west-southwest from the cape, and with Mount Fairweather nearly in line over it, La Pérouse obtained soundings in forty-three fathoms, and thence ten miles southeast by south half south, nearly parallel with the coast, he regularly increased his soundings to sixty-five fathoms. Twenty-nine miles west of Cape Fairweather, and twenty miles broad off the nearest coast, he places soundings in seventy-three fathoms.

Tebenkoff designates this headland as Cape Litūya.

A small stream enters the sea about a mile east of the extremity of the cape.

*Named by La Pérouse in 1786.

MOUNT FAIRWEATHER.

The magnificent peak of Mount Fairweather* lifting its eternally snow-covered head to an elevation of thirteen thousand nine hundred and forty-six feet above† the ocean, and frequently visible at a distance of one hundred and fifty miles at sea, lies in latitude 58° 57′ and longitude 137° 27′, nine miles from the nearest shore, and twelve from Cape Fairweather.

The natives know Crillon and Fairweather as the Litúya Peak.

Six miles north of Cape Fairweather a small stream named the Kakhvegin enters the ocean. Tebenkoff has a glacier marked upon it one or two miles inland.

CAPE FAIRWEATHER TO CAPE PHIPPS.

The general direction of the coast from Fairweather to Phipps, the south point of the entrance to Behring or Yakutat bay, is north 62° west, and the distance seventy-one miles. The shore leaves this general direction as much as seven miles, about ten miles north of Fairweather Cape, where is the eastern boundary of Dry Bay.

Tebenkoff describes this sketch of coast from the details of the head men of the parties sent to hunt the sea-otter, and says the shore is a "narrow strip of land, low, level, and covered with wood. Its breadth between the sea-shore and the foot of the mountains is five to seven miles, and many rivers and streams enter the narrow plain in different directions, and serve as so many canals for the purpose of inland navigation; but all the rivers are small and shallow."

DRY BAY AND ALSEKH RIVER.

About eleven miles north by west quarter west from Cape Fairweather is the eastern point of this bay, of which very little is known. The western point lies twelve miles west northwest from the eastern, and close under each flows one of the mouths of the Alsekh.

Tebenkoff says: The most important of the streams on this part of the coast is the river Alsekh, which at twelve or fifteen miles from the shore is divided into five branches, which flow through such low ground that the high waters very frequently cover a great extent of it, and at such times really form a shallow bay, having a width of twelve miles upon the ocean, and extending inland to where the Alsekh divides. In the middle of this Dry Bay is a rocky island two or three miles in extent and covered with wood.

La Pérouse anchored six or seven miles off the western point of this bay in thirty fathoms, muddy bottom, when the "entrance to the river bore north 17° east, and Cape Fairweather south 5° east." If these bearings are assumed magnetic, they will plot very well. He found the water change to a whitish color and

* Named by Cook in 1778.

† Captain Vasilieff, of the Olkritic (Discovery,) determined this altitude. Tebenkoff has 13,864 feet; Admiralty chart has 14,708.

almost fresh at three to four leagues from the mouth of the river. His boats spent five or six hours searching for an entrance and found two moderately large channels, but each had a bar on which the sea broke so violently that the boats could not approach it. From the ship perceived the water very smooth inside the bar, and a basin several leagues wide and two leagues deep. On his chart he places two islands along the mouth of the bay in line with the coast eastward and westward, and the two probable entrances at the east and west extremes of the island. Nine miles south of the west point of the bay he got soundings in forty-five fathoms. When off this bay, Vancouver says, "the nearest shore, distant seven miles, was near a narrow, shallow opening into a lagoon;" but he says no such bay or island as Cook describes exists in this neighborhood.

La Pérouse named this Behring's River.

On some Russian maps, the Alsekh is made to break through the Mount St. Elias or Yakutat range, and Cook mentions "this chain of mountains being interrupted by a plain of a few leagues extent, beyond which the sight was unlimited, so that there is either a level country or much water behind it;" and again refers to it when describing Mount St. Elias as "belonging to a ridge of exceedingly high mountains that may be reckoned a continuation of the Fairweather range, as they are only divided by the plain above mentioned." From Cook's position (about latitude 59° 04′, longitude 139° 24′,) when he saw this break, it would lie up the valley of the Alsekh. When Vancouver was seven miles west by south of the entrance to Shallow Bay, he says this interruption in the summit of these very elevated mountains was conspicuous, and looked like a plain composed of a solid mass of ice inclining gradually towards the low border; its surface was clean, smooth, and uniform in this depressed part of the mountains.

Thirty-eight miles northwest by west from Cape Fairweather is the opening of two streams by one mouth in about latitude 59° 14′ and longitude 138° 45′. Each stream has a village upon it from six to twelve miles from their junction, and the timbered land comes close to the ocean shore between them. Westward of these rivers the low country stretches twelve or fifteen miles into the base of the mountains, and is filled with lagoons and marsh in a measure destitute of timber, but part of the shore has a belt near its margin. Just west of the mouth of these rivers, Cook, by his bearings, places Behring Bay; and Meares anchored in the immediate vicinity in twenty-seven fathoms water and named it Diana Roads. Here the Indians came in canoes from the shore.

From the mast-head Vancouver saw lagoons over the low beach of this coast, and communicating with the ocean through breaks in the beach, across which the surf broke with much violence.

The range of mountains forming a snow-clad barrier behind the coast hence to Prince William Sound, is said by Tebenkoff to attain a general elevation of eight or nine thousand feet, and from all their gorges great glaciers force their irresistible way upon the low land.

BEHRING BAY, OR YAKUTAT.

Cape Phipps, in latitude 59° 33′.0, longitude 139° 42′, forms the southeast point of the entrance to this bay, but it should be borne in mind that this outer cape is called on the Russian maps the Ocean Cape, and that they designate the point three miles northward of it as Cape Phipps. The northwest point of the bay is Cape Manby, in latitude 59° 43′, longitude 140° 06′, and bears north 47° west from Cape Phipps, distant eighteen miles.

From Cape Phipps, Mount St. Elias bears north 34° 30′ west, distant sixty-two miles.

Vancouver says that "off Point Manby the water was found to be discolored at the distance of four miles from shore, where no bottom could be found with the hand-lead." Two miles north of Cape Manby, on its western side, a stream enters the sea, with a shoal some distance off its mouth. Puget says, (Vancouver, III, p. 237,) "The dangers in Behring Bay, particularly between Cape Manby and the island forming Port Mulgrave, are considered to be numerous, since several rocks were seen just showing their heads above water." But there is no doubt that he mistook for rocks floating masses of ice covered with dirt, such as he afterwards found in Icy Strait. Tebenkoff does not refer to any such danger, and it is quite probable that Puget mistook for rocks detached and floating masses of ice, covered with earth or stones, such as he subsequently met with in Icy Strait.

Douglas says, (Meares, p. 320,) "at the entrance to this bay we had fifteen, ten, and eleven fathoms water, over a rocky bottom, but higher up no soundings could be obtained with fifty fathoms of line." But he gives no distances, bearings, or sketch to indicate his position; he merely entered along the eastern low shores.

A Russian sketch of Port Mulgrave has soundings of five and seven fathoms half a mile off inner Cape Phipps, and rocks close under the point.

A spur from the Coast Mountain range comes towards Ocean Cape parallel and close to the southeastern shore of the bay; its southern extremity reaches within two or three miles of the coast, where the low shore is cut by a connected series of lagoons and streams, leading ten miles east-southeast from Port Mulgrave.

Cape Phipps and the Ocean Cape are represented as low and sandy and wooded a short distance back, but the whole point or peninsula is an intricacy of crooked channels, with from one to four fathoms of water in them. For five miles inside the point the shores are low, cut up by lagoons, covered with wood, and in many places the shores are covered with water in the rainy season.

Tebenkoff says that Cape Manby or Great Cape is high, and at some places steep and rocky; in his chart he represents it as low and not wooded close to shore. Vancouver says the shore west of it is a low, compact border of plain land, which towards Point Manby gradually appeared more verdant and fertile, and to the eastward of it the country was again well wooded.

La Pérouse anchored three leagues southwest of this "wooded point, (Manby,)" which he at first believed to be an island," but "subsequently found to be joined to the main by other land still flatter and without trees."

The general direction of the bay is north 34° east for twenty-four miles, diminishing from eighteen to two miles in width, four miles from the entrance to Digges Sound at the head, which Tebenkoff says receives "a small stream coming from between enormous masses of ice; the mouth of this stream is in latitude 59° 54′, longitude 139° 23′. Here Malespina, being disappointed in finding the northwest passage, called the harbor 'Assurance bay,' and its entrance Ferrero, (Maldonado's Christian name.")" Vancouver has described the bay, and says the progress of Puget was barred at the entrance to Digges Sound by a solid barrier of ice. The Russian chart represents its shores as masses of ice, and named it Disenchantment Bay, but places an anchorage in its southeast part.

Tebenkoff's chart represents the north shore as low and sandy and covered with wood to the base of the mountains, from which flows a stream emptying into the bay fifteen miles north by east from Cape Phipps, and having an extensive sand-bar at its mouth. In his hydrographic notes he says the shores of Yakutat are mountainous, woody, and in many places cut by glaciers; but the climate is better than that of Prince William Sound.

The southeast shores are broken and fringed by numerous wooded islands with low shores, and forming a great number of small bays and anchorages with very deep water in most of them. The entrances to these anchorages have strong currents and are represented by the Russians as difficult of access for sailing vessels.

Inside of Cape Phipps of the Russians, and three miles south half east, is a low wooded point called Point Turner,* with very deep water quite close to it, and a reef of rocks parallel to it running along its eastern face a little more than a quarter of a mile distant. Between this reef and the long point the depth of water varies from twenty to ten fathoms, and the anchorage is well up the shore of the point to avoid the very strong currents that rush past it.

Belcher makes the following remarks in approaching Port Mulgrave: "Hauled up and brought Mount Fairweather over Cape Turner, which the chart showed to be a good leading mark (north 88° east compass) for the entrance. We were even in doubt on opening the mouth of the port, which appeared like a cluster of islands. * * * Bore up for the anchorage, passing from soundings at sixty fathoms suddenly into thirteen and eight, by keeping too close to Cape Phipps, and as suddenly deepening again to forty, until reaching the ledge off Cape Turner, when it exceeded the length of our hand-lines. * * * Anchored close around the low gravelly point of the island in thirteen fathoms, within three hundred yards of the beach."* When he weighed anchor he experienced great difficulty in getting it up on account of the tough clay in which it had hooked.

* Named by Dixon in 1787, after his second mate.

This anchorage and the adjacent waters comprise the Port Mulgrave of Vancouver. Tebenkoff gives a sketch of the islands and channels, &c. The depth of water between Cape Phipps and Cape Turner is from fifty to eighty fathoms, and the currents are said to run with great rapidity.

When Belcher left this bay he was, during the night, drawn towards the shore into seven fathoms, with heavy breakers inside him. He supposes there may be an off-shore shoal, but his explanation, and his failure to search for it, clearly indicate that he was nearly lost on the main shore.

In 1803 Petroff reported that the usual rise and fall of tide in June and July, at Cape Turner, was eight feet; but in October and November it reached over sixteen feet. He reports the time of high water at full and change, 12*h*. 43*m*.

Cape Turner is laid down in latitude 59° 33′, longitude 139° 35′, and Tebenkoff's sketch is compiled from the examinations of Buligin and Kromtchenko; the first of whom laid down the anchorage in Yakutat Bay northeast of Khantak Island, and the latter those on the south side in 1823.

In 1795 the Russians had a post named New Russia on the lagoon inside Cape Phipps, but it has been abandoned, as also one on the steep cliff east of the anchorage under Cape Turner.

Cook did not see or enter this bay, but he applied the name Behring Bay to the harbor he supposed Behring anchored in when he first made the coast. La Pérouse declared no such harbor existed, and yet by plotting his course and coast line westward from Litúya Bay, his Baie de Monté falls exactly upon Behring Bay. It was entered and examined by Dixon, and named Admiralty Bay; afterwards Meares was in the entrance; Puget examined the bay thoroughly, and Vancouver named it Behring Bay, as being what Cook intended. By the Russians it is known as Yakutat Bay. It is doubtless the bay in which Behring first anchored when he discovered this part of the coast in 1741.

The Indians inhabiting the coast between Yakutat and Tchugatz Bays are *Ugalensé*; they are not numerous; reckon about thirteen hundred souls; have their own language; live along the rivers and subsist on fish and products of the chase.

KNIGHT'S ISLAND.

The southern point of this island, which lies in the northern and eastern part of Behring Bay, is twenty-one miles east of point Manley and thirteen miles northwest one-third north from the inner Cape Phipps. Half-way between it and the north end of the *Khantaak* (*Dish*) Island lies an islet named Krustoi or Steep Island. Knight's Island is about two miles long, southeast half east and northwest half west, and about a mile broad. It lies about half a mile off the eastern shore, and admits of a navigable passage all round it; but there are some rocks lying about a mile from its west point, and off its northeast side there is an islet between it and the main land. East of the south point of the island the main shore retreats and forms a cove open towards the northwest with

good anchorage, but no soundings given. This is the *Eleanor Cove* of Puget, who placed the south point of Knight's Island in latitude 59° 44′. Tebenkoff places it in latitude 59° 43′, longitude 139° 21′.

CAPE PHIPPS TO CAPE SUCKLING.

From Cape Phipps to Cape Suckling the course is north 78° west, and the distance one hundred and twenty-five miles, with the coast curving northward of this line as much as twenty miles, especially at the entrance to Icy Bay. This stretch of coast is a low fringe of level plain lying between the ocean and the foot of the mountain range of Mount Elias. The soil is sand and gravel covered with sphagnum, through which grows the spruce, and from which grass springs. No wood, however, exists between Cape Manby and Cape Riou, and Vancouver describes it as presenting a naked barren country, composed of apparently loose unconnected stones; gradually the surface assumes a brownish appearance as if from vegetation. The average width of this skirting is only about three miles; where it reaches the mountains the ravines are filled with eternal ice, and all the streams cutting through it are small and shallow, and come from the glaciers. From the description of this mountain range, its approaches, glaciers, &c., this low border of stony coast line may be considered simply as a great combined moraine from all the glaciers.

The following is the description of La Pérouse as he approached the coast just westward of Point Manby, and of which he gives an extended view: "Masses of snow covered a barren soil, unembellished by a single tree. The mountains appeared to be at a very little distance from the sea which broke against the cliffs* of a table land three hundred or four hundred yards high. This plain, black as if burned by fire, was totally destitute of verdure. * * * As we advanced we perceived between us and the elevated plateau low lands covered with trees, which we took for islands. The table land serves as a base to vast mountains a few leagues within. Approaching the coast he saw to the eastward a low point (Cape Manby) covered with trees which appeared to join the table land, and terminate at a short distance from a second chain of mountains."

The depth of water close along the shore is generally from five to twelve fathoms at two cables' length, and at two miles is from thirty to forty fathoms. About twenty-eight miles southwest of Cape Phipps, La Pérouse obtained eighty fathoms over muddy bottom; fifteen miles off the coast, in longitude 140° 46′, Cook found eighty-two fathoms of water over muddy bottom; nine miles off the coast, in longitude 141° 46′, Vancouver found thirty fathoms of water; a league south of Point Riou he found twenty-three fathoms; six miles off an abrupt cliff, in longitude 142° 47′, he found forty-two fathoms, with deeper water to the westward and an in-shore eddy current setting his vessel in a calm to the eastward.

* From his position, and distance from the coast twenty or thirty miles, it was utterly impossible for him to see the breakers on the shore; and his subsequent observation of seeing the intervening low land proves it.

The coast current is to the westward, parallel with the shore. This fact has been noticed by all navigators. Belcher states it at one to one and a half mile per hour when eastward of Cape Suckling. Vancouver experienced an exception, an in-shore eddy current setting to the eastward when six miles off the bluff point lying forty miles east of Cape Suckling. This may have been in part owing to the outflow of the river Kaliekh, off which he then was.

Forty miles west-northwest from Cape Phipps lies Cape Sitkagi, a low projecting point of land situated in latitude 59° 47′, according to Vancouver, and longitude 140° 41′, according to Lipinski. Eastward of this the shore is destitute of vegetation, and a great marsh lies between the shore and the foot of the mountains. Westward of it there is no wood along the immediate shore, according to Tebenkoff, but there is a belt along the base of the nearest mountains.

This point is Pointe de la Boussole of La Pérouse. Thirteen miles northwest by west quarter west from Sitkagi, lies the Cape Riou of Vancouver, and the Low Cape of Tebenkoff.

ICY BAY.

From Cape Phipps to Cape Riou the distance is fifty-one miles, and the direction north 65° west; Cape Riou, in latitude 59° 53′, and longitude 141° 14′, forms the southeast point of Icy Bay, which runs nearly north for seven miles from the middle of its entrance. Vancouver describes the point as low, well wooded, with a small islet detached at a little distance to the westward of it, and not laid down by Tebenkoff, nor seen by Belcher, who says that the point "must have dissolved. The base of the point probably remains, but being free, for some distance of the greater bergs, it presented only a low sand or muddy spit, with ragged, dirty-colored ice, grounded."

The north point is called Icy Cape, and lies north 52° west, distant seven miles from Riou, which Vancouver describes as a high, abrupt, cliffy point, forming the west point of the bay, bounded by a solid body of ice or frozen snow.

The eastern shore is low, and has a large lake between it and Cape Sitkagi. Vancouver says that from the "eastern side of this bay the coast is formed of low, or rather moderately elevated land. The western shore is a compact mass of ice, and terminates toward the ocean in a high, abrupt, and sharp point. Belcher says the small bergs, or soft masses of ice forming the cliffy outline of the bay, were veined and variegated by muddy streaks like marble, and where they had been exposed to the sea were excavated into arches," &c.

Inside the entrance of the bay Tebenkoff gives soundings in twelve and fifteen fathoms to the head, where the depth is five fathoms. There can be no anchorage here with southerly winds, which would set the whole force of the swell into it.

Vancouver gives a view of the western shores of Icy Bay, with Mount St. Elias in the background. Belcher says, "the whole of this bay, and the valley above it, was found to be composed of (apparently) snow-ice, about thirty feet in

height at the water-cliff, and probably based on a low, muddy beach." The soundings of Tebenkoff demonstrate the existence of the bay; while Vancouver was within a league of Cape Riou and saw into the bay.

It is probable that the glacial formation on the bay may sometimes fill it; and that the island which Vancouver saw was a mass of earth-covered ice aground. Thirteen miles southwest by west from Icy Cape Vancouver found soundings in thirty fathoms; three miles south of Cape Riou he found twenty-three fathoms; and Belcher says that eastward of Riou he edged along, keeping within a mile and a half of shore, carrying from ten to fifteen fathoms.

MOUNT ST. ELIAS.

This great snow peak lies in latitude 60° 22′.6, and longitude 140° 54′, and rises to an elevation between sixteen thousand and seventeen thousand* feet above the sea, and is situated twenty-nine miles from Icy Cape, and twenty-three miles from the head of Icy Bay, which receives a stream from the flanks of this range. This remarkable pyramid of eternal ice is acknowledged by all the old navigators and discoverers as a magnificent spectacle from the sea, especially when the whole coast range to Mounts Fairweather and Crillon is visible. In 1839 it began to emit volumes of smoke and vapor from a crater opened on its northeast side, and in 1847, when the earthquake occurred at Sitka, Mount St. Elias ejected ashes and flames. There appears to have been a general subterranean disturbance at this epoch, for Mount Baker, in Washington Territory, in latitude 48° 45′, was in a state of eruption, and shocks were felt along the Aleutian Islands. An earthquake was felt on Agomak, one of the Shumagin group, and in Alaska Peninsula Pavloff Peak ejected ashes and flame.

The mountain is visible over a hundred and fifty miles at sea, and has been sketched by Vancouver and others.

CAPE IAKTAG.

This is a low, rounding point of land, twenty-three miles west of Icy Cape, and is the first point along this low shore where outlying rocks have been noted. Three miles southwest of the southern extremity of the cape, Tebenkoff lays down sunken rocks with thirty-five fathoms of water outside of them.

About fifteen or eighteen miles west by north half north from Cape Iaktag, Vancouver notices an abrupt cliff at the seaward extremity of a range of hills that stretch, as it were, perpendicularly to the direction of the base of the mountains, intercepting the low border, and terminating at the sea-side. Five or six miles south of this point he found bottom in forty-two fathoms, with an in-shore eddy current carrying his vessel eastward in a calm.

*According to Tebenkoff it is sixteen thousand nine hundred and thirty-eight feet high; Grewingk, sixteen thousand seven hundred and fifty-four feet; Russian Chart of 1848, seventeen thousand eight hundred and fifty-four feet; Admiralty Chart No. 2172, fourteen thousand nine hundred and seventy feet; and D'Agelet in La Pérouse's expedition, twelve thousand six hundred and seventy-two feet, but the latter placed it eleven or twelve miles in error.

Six or eight miles westward of this cliff is a small opening in the beach, indicating the mouth or mouths of the River Kaliekh, from which the discolored muddy water was found several miles distant. Off this stream Tebenkoff has sixteen fathoms, about a mile distant.

Sixty-nine miles west from Icy Cape is the southern extremity of an extensive reef, stretching six miles south of a short space of rocky shore-line. It is in latitude 59° 58′, longitude 143° 43′, and called Laida by Tebenkoff. Vancouver, who was close in with the land at this place, notes a sand point lying off two or three miles, and says he passed it at the distance of four miles without gaining soundings, with thirty-five fathoms of line; it extends in a southerly direction two miles from the low point of land forming the west point of a bay, apparently very shoal, judging by the quantity of white, muddy water that flowed out of it. But Tebenkoff has this shoal or reef separated by a narrow channel between it and the shore, without, however, giving any soundings. Two rocky islets lie off the bluff point, and towards the northeast part of the reef.

From Cape Suckling this reef lies east seventeen miles, and from the south point of the reef making south of Kayes Island, it bears north 72° east, distant thirty-six miles. Between it and Cape Suckling the shore-line "shoots out in small projecting points, with alternate low cliffy, or white sandy beaches, being the termination of a border of low woodland country, extending some distance within until it reaches the foot of the mountains."

CAPE SUCKLING.

Between Kaye Island and the Laida reef lies the low point named Cape Suckling,* its eastern extremity laid down in latitude 59° 59′, and longitude 144° 11′; its western point, within eight miles of the northeast point of Kaiak or Kaye Island, being the point to which Vancouver applied the name.

Belcher says, "in one direction from the southward Cape Suckling exhibits on its lower profile the brow, nose, and lips of a man. It is a low rock, stretching out from a mountainous isolated ridge, which terminates about three miles from it easterly, where the masses of ice-pyramids terminate." Vancouver says, "the highland of Cape Suckling, when thirty-nine miles south 23° west, (compass,) from it." Cook says, "it is low, but within it is a tolerably high hill, which is disjointed from the mountains by low land, so that at a distance it looks like an island." Tebenkoff lays the whole cape low and flat for ten or twelve miles inland, with large lagoons northward of it, and also a stream called the Little Ugalentz, emptying nine miles east-northeast from the eastern point of the cape. Off the mouth of that stream Belcher found drift trees of large size, one measuring about two hundred feet in length. The water was whitish for three miles off shore, with the line of separation from the salt water distinctly marked.

Some distance off shore and to the eastward he found the current setting a

* By Cook, 1778.

mile to a mile and a half per hour to the west, no drift trees then noticed, and yet the white water was then two miles outside his position.

The south face of Cape Suckling is nearly east and west for five miles, and from its eastern limit commences that long reach of low, sandy beach, from five to ten miles in width, which runs hence bordering the coast to Hinchinbrook Island, a distance of seventy-five miles. This extensive sandy flat is cut through by numerous streams finding their way from the low shores to the ocean. At the distance of one or two miles from its outer edge the depth of water is not more than five to ten fathoms. Small streams fed by lakes and by rivulets from the glaciers abound along the shores; and one large stream, the Atna or Copper River, finds its outlets between Kayak and Hinchinbrook Islands. Off the cape, Douglas says he had ten to twenty fathoms over a clayey bottom. Cape Suckling was named by Cook: the Russians call it Cape Simeon.

KAYE, OR KAYAK ISLAND.

The southern point of this island lies in latitude 59° 49′, longitude 144° 53′, with an island and reef stretching three miles south of it. It is called Cape Hamond by Vancouver, and St. Elias by Tebenkoff. Belcher says Kaye Island, as seen from the east, appears as two islands. The southern point is a high table rock, free from trees or vegetation, and of a whitish hue; the other is moderately high land for this region, with three bare peaks, its lower region being well wooded. Cook says the south point is very remarkable, being a naked rock elevated considerably above the land north of it. There is also an elevated rock lying off it, which from some points of view appears like a ruined tower. Vancouver calls the south point a "very conspicuous cape," which he named Cape Hamond and placed in latitude 59° 48½′. Tebenkoff calls it Cape St. Elias. Douglas gives a view of the island, with this high southern point, and the rock, which he named *Steeple Rock*, bearing southwest by south ten miles distant.

Tebenkoff gives two views of the island: one with the south peak of the island bearing north 78° east, twelve miles distant; and the other where the island bears from north 2° west to north 8° east, no distance stated. Cook gives three views of it: one with the south point bearing west southwest eight or nine leagues distant, with the Steeple Rock; the island bearing from 5° west by west to northwest quarter west, distant from nearest part three and one-half leagues; the third with Steeple Rock bearing north two miles and showing pinnacle one-third the height of the main rock, on the west side.

Vancouver describes the north shore of the island as a low tract of land, well wooded, and that it is indented by small coves, with a channel between it and the sandy flats of Controller's Bay.

The west side is nearly straight, and runs northward twelve miles. The eastern face of the island runs from the south point, where it is very narrow, to the northward; and in latitude 59° 38′, where it is three miles wide, runs east-northeast for six miles. Off this eastern extremity, named Mesurier Point, lies a rocky

reef and two small islets stretching two or three miles to the broad sandy beach west of Cape Suckling; but between the islets and this beach Puget found a narrow, intricate channel with four fathoms.

Cook landed upon its northeast side, and says that towards the shore the island has bare sloping cliffs, with a very narrow beach of large pebble-stones intermixed with brownish clayey sand. The cliffs are a bluish rock in a moldering state. The timber is spruce from two to three feet in diameter, and continues from the top of the cliff half way up the sides of the hills. Sphagnum covered the whole island. He named it after Dr. Kaye.

Puget anchored between the northwest point of the island and the south point of Wingham Island in seven fathoms, with Wingham Island bearing from north 15° east, to west 17° north, by compass, Kayak from south 14° west to north 38° east, and the nearest shore being a steep green point on Kayak island, south 11° west, one mile distant.

A DOUBTFUL ROCK.

Tebenkoff gives all that is known of a rock or bank supposed to exist in latitude 59° 36′, longitude 144° 50′, and in the track of vessels bound to Port Etches from the position of the Pamplona Rock. "Tradition says that south of the Island of Kayak there exists a rock. Mate Zaikoff, of the ship Alexander Newski, states in his report in 1781, that 'being afraid to run in the fog further south on account of a bank situated south of Kayak, we were compelled to lay to.' Guided by this remark, it is located on the chart with a doubtful sign, thirteen miles south of the southern extremity of Kayak Island."

Vancouver beat over a great deal of ground in this immediate vicinity without encountering any danger.

WINGHAM ISLAND.

Off the northwest point of Kaye Island lies Wingham Island, about two miles distant, with six fathoms of water between them, but a bar of two fathoms connecting the southeast part of Wingham with the north shores of Kayak. Wingham Island is four miles long north and south, by two miles wide. Off its north point are laid down some rocks, but on its eastern side, reached by passing its north end from the west through a narrow channel and close to the island shore, Puget says it forms a tolerably well-sheltered roadstead even against the easterly winds, and that good anchorage will be found to the southward of the first small beach from its north point at a comodious distance from the shore; at this anchorage the northeast point of Kayak bears south 63° east, and Cape Suckling north 76° east, true.

And Vancouver speaks of the excellent shelter which these islands afford against the southeasters.

Belcher says this island can be seen to nearly its whole length between Cape

Suckling and Point Mesurier, (the northeast point of Kayak Island;) that it is moderately elevated, rising in three hummocks which are bare on their summits. The southern hummock from a distance appears separated from the rest on account of the lowness of the neck connecting them. The whole is well clothed with trees.

If he saw this island from a position east of Cape Suckling he was at a distance of twenty-eight miles; and either the north end of Kaye Island is laid down too far north by Vancouver, and Tebenkoff who followed him, or Wingham Island is not laid down far enough north.

Tebenkoff represents the island low, with the south point rocky.

Puget says that in many places the shores are steep, rugged, rocky cliffs; the island is well wooded; and on its eastern shore two small streams empty into the sea.

When at anchor inside the north point of Wingham Island, he determined its latitude 60° 05½′, and Tebenkoff gives the longitude 144° 57′. At his anchorage he could catch no fish after repeated trials.

The nearest point of the main shore lies north, seven miles distant from the north end of Wingham Island, and was named Cape Hey by Vancouver. Wingham was called Steele Island by Portlock.

CONTROLLER'S BAY.

The indentation in the coast north and east of Kayak* and Wingham Islands, and west of Cape Suckling, was named by Cook Controller's Bay, into the northwest part of which enters a small river called the Chilkaht, emptying a larger lake of the same name lying at the base of the mountains.

In the middle of the northwest part of this bay, and six miles off the mouth of the Chilkaht, and three miles east of Cape Hey, lies the island of Kanak, two or three miles in extent and overgrown with wood. South of this island, and towards the edge of the great flats, are many shoals covered with grass, and having the appearance of small, low islands.

The great flats of Controller's Bay extend four miles south of Cape Hey, and as many from the west point of Cape Suckling. Between these two positions it curves towards Kayak and Wingham, and leaves a tortuous channel in which four fathoms was carried to the ocean between Kayak and Cape Suckling. In this channel the tides were found to set irregularly, and the winds baffling. Puget's vessel was ashore on the flat east of Wingham, but got off readily.

Refuge in this vicinity is very important, as no harbor exists nearer than Behring Bay to the east, and Port Etches sixty miles to the west.

Forty-one miles west-northwest from Cape Hamond, and nearly in line to Hinchinbrook, Vancouver lays down soundings in thirty-eight and forty fathoms of water.

* Named Kayak from its fancied resemblance to a double canoe or kayak. Teste Kadin.—DALL.

OTCHEK OR MIDDLETON ISLAND.

The longitude of this island is not positively determined. It was visited in 1838 by one of the mates of the Russian-American Company, and he reports that it is above seven miles long from north to south, with a breadth of about three miles. The north end is in latitude 59° 30′, longitude 146° 30′. Off both extremities of the island are reefs extending for three miles on the prolongation of the longer axis. Off the northern reef is a rock upon which the water breaks in great jets, giving it the form of a pillar, even with a comparatively smooth sea, and it has been appropriately named *The Fountain.*

The south point of the island is placed in latitude 59° 23′ and longitude 146° 31′ by Netzretof, with the reef four miles south of it.

On the west side is a rock situated southwest three miles from the northern point of the island, and north-northwest of the place used for anchoring, where a small cove exists with thirteen fathoms of water over a gravelly bottom.

From the north point of the island Cape Clear bears north 71° west forty-nine miles; Cape Hinchinbrook north 11° west forty-seven miles; Cape Hamond north 50° east twenty-three miles.

Thirty-two miles south 44° west from the south point of the island Portlock gives a sounding in ninety-six fathoms, over muddy bottom.

The surface of the island is comparatively low, quite level, and destitute of trees; the shores are craggy, especially on the west side of the island, south of the anchorage. A few huts are scattered on the shore near the anchorage, and serve as a shelter for the natives temporarily sojourning here for the purpose of collecting sea-weeds and hunting seals. Several small lakes, places of refuge for birds of passage, are found along the eastern shore.

In 1837 Belcher anchored off the island in twenty-one fathoms of water, but does not state where, nor give the position of the island. He says it does not exceed thirty feet in height, has a very soft, spongy soil over micaceous shale, interspersed with quartz dikes. He refers to it as Rose or Middleton Island. At his anchorage he caught halibut weighing one hundred and forty-six pounds.

Tebenkoff visited it in 1840 and gives a view of it, when the south point bore south 62° west, (compass,) six miles distant.

SEA-OTTER BANK.

This bank lies nearly equally distant between the north end of Otchek and south end of Kaye Islands, being north 50° east, twenty-three miles from the former, and south 80° east, thirty-two miles from the latter. It is laid down as two rocks, two miles east-northeast and west-southwest of each other, with twenty and forty fathoms close to them, and a line of soundings is laid down with depths of forty, fifty, fifty-five, and sixty-five fathoms, extending southwest by west for nine miles.

The reef was discovered in 1798, with the announcement that to the "south-

east of Hinchinbrook Island (Khtagaliouk) there exists a bank which the Chugach natives assure us abounds in sea-otter, which resort here for breeding." The existence of this bank was doubted for a long time; however, in 1842, Mate Lindenberg, of the Russian-American Company, saw it, but having an overcast sky he determined its position approximately from Nutchek Bay, and obtained latitude 59° 44′ and longitude 145° 54′.

PAMPLONA ROCKS.

Many doubts have been expressed about the existence of these rocks, and especially as to their being visible. Captain Bryant, who was whaling here for some years, says there is a submarine range in the vicinity of the position usually assigned to it, but this can hardly be the case if they are the resort of the sea-otter, as will be shown to be the case.

Tebenkoff says: "In the parallel of this Dry Bay (latitude 59° 03′, and approximate longitude 142° 40′) there exists a rock discovered in 1779 by a Spaniard, Captain Arteiga, which he called Rock Pamplona. In 1794 Mate Talin, in the ship Orel, (Eagle,) saw it and named it after his vessel, but did not determine its position."

The navigators of the Russian-American Company are divided in opinion about it, but agree that one of their number reports seeing it as a three-pointed rock; another informs us that he sailed over the longitude laid down by Tebenkoff and did not see it, although the day was clear and a man aloft on the look-out.

On various charts the position ranges three miles in latitude, and thirty minutes of arc in longitude.

In August 1867, the United States revenue steamer Lincoln intended to search for it, and when about twenty miles south 60° east of its supposed position hove to and sounded with one hundred and eighty fathoms of line, but found no bottom. She drifted to the ascribed latitude about three o'clock in the morning, but a dozen miles to the eastward, then steered a course that passed four miles north of its ascribed position, at five o'clock a. m., with a clear horizon. At seven and three-quarters o'clock a. m., in latitude 59° 12′, and longitude 143° 05′, no soundings could be had with one hundred and eighty fathoms of line. No other efforts were made to find it, although the noise of birds frequenting land had been heard during the early morning.

Vancouver's account of this rock is as follows: George Portloff informed us that a very dangerous rocky shoal, about fifteen miles in length, lies by compass in a direction south by west sixty-three miles from a place called by them *Leda Unala*. This Mr. Puget conceived to be near the point that had been named Point Riou, the eastern cape of the entrance to Icy Bay. Portloff himself had been on this shoal, taking sea-otters, and stated that the first discovery of it was owing to a Russian galliot having had the misfortune some years before to be wrecked upon it; two of the crew were drowned, but the rest escaped in their

boats. Since that period an annual visit has been made to it for the purpose of killing sea-otters, which are there met with; and as it generally proves advantageous, Portloff meant to stop there on his return. "From the Spaniards, also, I afterwards became acquainted that a very dangerous rock existed in this neighborhood, the situation of which they had taken great pains to ascertain, and had found it to be south 41° east from Cape Suckling at the distance of 36 miles, and which was called by them Roca Pamplona; when this was delineated on our charts it appeared to lie in the direction south 77° east, distant eight miles from the rocky shoal described by Portloff; hence it may be inferred that Portloff and the Spaniards intended the same shoal, although it is not stated by the latter to be so extensive as by the former. It is without doubt dangerously situated for the navigation of this coast."

* * * The circumstantial evidence appears too strong to doubt the existence of this rock.

ATNA OR COPPER RIVER.

From Cape Hey or Kanak, in latitude 60° 13′, longitude 144° 56′, the coast runs west by north half north for thirteen miles to the eastern mouth of the Copper, with Cape Martin or Kikhtak (*Anglicé* Island) lying about half way, and on the same course. This mouth of the river is situated in latitude 60° 17′, longitude 145° 20′, according to Tebenkoff. Thence the coast runs northwest to the broad mouth of the same stream, passing several smaller mouths of the river before reaching it. Along this wooded coast lies the broad sand beach or flat which bounds the shore for a width of five or six miles.

The principal mouth is a wide, shoal bay, opening upon the broad, low delta, and extending in a general direction north-northeast to the great bend in latitude 60° 40′, and longitude 145° 45′, where it is two miles wide; thence it sweeps to the south-southeast for twenty-three miles parallel to and about three miles from the ocean shore, around the spur from the mountain chain to an island where the two principal streams divide, at a distance of six miles from the mouth of the eastern one. The whole of the low delta formation is attributed to the debris brought down by the Copper River.

Near the edge of the great flat, three miles south of Cape Whitsed and four miles east of Point Bentinck, lie two islands, and near the eastern one the main body of water of the Copper River enters the ocean. These islands are called the Nik-khtykhat; off them soundings of only five and seven fathoms are laid down a mile and a half from this flat. Nagaief went through the shallow channels of this great flat with his bidarkas (skin canoes) from Kaiak Island to Khtagatiouk or Kinchinbrook Island. The whole delta of the river, thirty miles long by four or five wide, is overgrown with willow. Inside the principal mouth, called Ani by the natives, Tebenkoff says there is a small rocky island* one mile in extent, about ten miles from the ocean edge of the flats and in the middle of the river,

* Yaitchnoi or Egg Island.

where it is five miles wide. Six miles north of this islet the river turns very suddenly to the east and then south-southeast, at the same time contracting to a mile or less in width. In the northwest part of the great bend is situated an Indian village called Alaganik, and placed by Serebrenikoff in latitude 60° 41′.3 and longitude 145° 49′.

The current in the lower reaches of the river is sluggish. A few miles eastward of the second great bend at the eastern mouth the Russians rather indefinitely locate a large lake, the resort of ducks during the breeding season.

The course of the river has been partly traced by officers of the Russian-American Company, several degrees northward having been reached by an expedition following Klneek (Fire) river, flowing from Lake Plavejno, in latitude 62° 10′, and longitude 149°, and from the lake descended the Tleshytni River and reached Copper River.

Serebrenikof ascended the river to latitude 62° 48′.7, longitude 147° 30′, where he lost his life at the hands of the natives whom he attempted to wrong, but who delivered up his instruments, books and maps. The general course of the river for one hundred miles is almost north; then runs west-northwest for ninety miles; then north, north-northeast and east. The depth of the river is shallow; the width occasionally not more than half a mile. The banks are mountainous, especially the right one. In many places these mountains present perpendicular precipices broken by great gorges and ravines from which come glaciers. As the glaciers are forced into the river, they are undermined by the stream, and great masses fall into the stream, with awful reverberations for miles.

Grewingk says that the gorges bordering the river are filled with ice twenty fathoms thick and one mile wide near the river. In some places this ice is covered with a soil upon which moss bushes and berries are growing. In the middle of the river ice masses are often seen covered with fresh green bushes and ripe berries.

Above the rapids, which are formed where the river breaks through the glaciers of the Yakutat range, no more ice is found, and the country is free from sea winds and fogs. These winds and fogs confine themselves to the ocean slope of the range. In winter the natives leave the coast and retire to the interior.

One hundred miles above the rapids of the Atna the swift Tschettschitna enters from a lake one hundred miles east of its mouth. It is on this small river that the pure copper is found in masses from a few pounds to forty pounds. In 1867 we could not ascertain the precise locality of the copper; we learned that the inhabitants have tried to retain the secret of its location, and several parties have been murdered or held as slaves in attempting to explore the country; but one of the officers of the company informs us that the copper is found about twenty-five or thirty miles above the eastern mouth, and in readily moved masses of pure copper. We received a piece weighing about fifteen pounds.

There is an Indian settlement at the mouth of the Tschettschitna, and when the ice breaks up in the lake the stream suddenly overflows its banks and rushes with such swiftness that the inhabitants flee to the mountains.

On the left bank of the Atna, a mile above the Tschettschitna, is the single house of one of the Russian Company's traders. Tebenkoff places it in latitude 61° 28′.1, and longitude 145° 16. Up to this point the river is very sparsely peopled. The shores are rocky, but covered with fir, poplar, willow, and birch. North of this post there is a tolerably extended plain between the mountains on both sides of the river.

On the left bank, directly in view of the post, is the sugarloaf-shaped volcano Mount Wrangell, covered with perpetual snow, but emitting fire and smoke. There are several heavy earthquakes every year. It is not part of any mountain range, but an isolated peak. On Grewingk's map it is less than ten miles north of the trading post.

In winter the natives, by an easy portage, pass to Prince William Sound, from a lake which they reach by ascending a small stream emptying into the Atna below the trading post; others travel over mountains, lakes, and great frozen marshes, to the head of Cook's Inlet.

The natives call the river Igrilet, but the Ugalense who trade with them call the eastern mouth the Atna. It is called the Copper River from that metal being found upon it and its tributaries. None of the old navigators saw the principal mouth, nor did Belcher as late as 1837. The natives of the river are described by Tebenkoff as savage, bloodthirsty, suspicious, stubborn, and unwilling to have anything to do with the Russians. This disposition appears to have been inflamed by Serebrenikoff's imprudence, for in 1852 they "burst into a very serious and dangerous revolt," which was, however, put down.

The natives inhabiting the coast between Yakutat and Prince William Sound are called Ugalense, and number about thirteen hundred souls. They have their own language, and inhabit the banks of the streams, living upon fish and such berries and vegetables as they can gather or grow.

PRINCE WILLIAM SOUND OR CHUGACH GULF.

This extensive body of water has an area of about twenty-five hundred miles. It is very irregular in shape and outline, but may be described as a great gulf entering the coast to the northward and spreading great arms in every direction. The entrance, reckoning from Cape Hinchinbrook to Cape Puget, fifty-five miles apart and about west-southwest and east-northeast from each other, is mainly occupied by large islands, of which Montague is the principal one, stretching well out into the ocean, and by its general direction of northeast and southwest nearly blocking the entrance.

The easternmost part of the sound is the head of Cordova Bay, whose waters reach within four miles of the great bend of Copper River, with an intervening low wooded peninsula lying to the southwest, and whose southern extremity, Point Whitshed, reaches within five miles of Point Bentinck, to the northeast extremity of Hinchinbrook Island. This intervening space between the two

points would form another entrance to Prince William Sound, but is filled by the western part of the great Copper River flats.

Many of the islands in the sound, and of the points and peninsulas formed by the great arms penetrating the land, are low and covered with wood; but behind these rise eternal barrriers of ice mountains, especially to the north and west. The waters of the sound are very deep, the rise and fall of the tides quite large, and the currents in the different channels are very strong, with strong tide ripplings in the entrance between Port Etches and Montague Island. The waters of the sound are chilled by the large amount of ice-water from the surrounding glaciers; and, in consequence of this and the colder air from the mountains, meeting the warmer waters and warmer vapor-laden airs from the Gulf of Alaska, the weather is very changeable, and sudden squalls of wind and thick fogs prevail.

North and west of the sound lies an elevated range of mountains, stretching northwestward from the western part of the Mount St. Elias range, (perhaps being a continuation of it,) and inclosing the sound round to the north. The highest peak is about eighty miles distant from the shores; and Tebenkoff saw the range in 1848 in all its grandeur, but remarked no indication of any active volcanoes. On the north shore glaciers come down to the heads of the bays, and Whidbey says that such great masses are sometimes detached from their faces that the noise of the shock passes over the sound like dull, heavy thunder, and he felt the earth tremble at a distance of six miles from the locality of one of these concussions.

There is communication between the western part of the sound and Cook's Inlet; and Vancouver understood that a party he met with had crossed from Turnagain arm of Cook's Inlet to Passage Canal of Prince William Sound. Tebenkoff says that looking at the short distance which separates these waters, it would seem as if the isthmus were the best route of intercommunication; but the natives prefer to take either of the outside routes, or a portage of eight miles from Resurrection Bay, in latitude 60° 07′, to the lake whence the Kakna River rises, and descend to Cook's Inlet, in latitude 60° 32′, where the Russians have the stockaded post St. Nicholas. Grewingk's map indicates that this portage exists between the head of Resurrection Bay and the Tustumena Lake, which lies on the western flank of great glaciers, and empties by the Kassilov River into Cook's Inlet, a few miles south of Fort Nicolas.

The passage on the isthmus passes through a ravine between two mountains; the ravine is filled in part by a glacier, from beneath which flows a stream. During summer this ice melts, and leaves a continuous cavern adorned with icy stalactites overhanging the stream. Some courageous natives during their winter travel take the isthmus route, when the ravines and precipices are covered with drifted snow. (Tebenkoff.)

Vancouver says the sound required the greatest circumspection to navigate, and although it diverges into many extensive arms, yet none of them can be considered as commodious harbors, on account of the rocks and shoals that obstruct

the approach to them or of the very great depth of water at or about their entrances.

The highest latitude reached by arms of the sound is in Port Valdes, latitude 61° 03′, longitude 146° 57′ with no ice at its head, and Port Wells, latitude 61° 02½′, longitude 148° 05′, with a great glacier at the head.

The natives reach Copper River about latitude 61½° from some one of the numerous arms at the northeast part of the sound.

The number of Indians in the sound is estimated at sixteen hundred souls by Tebenkoff. The principal settlement is at Fort Constantine, and the second on Tklalkhiout or Hawkins Island, northeast of Hinchinbrook Island. The Indians of this region are called the Chugach.

For remarks on the climate of the sound see another page. Portlock experienced very foggy, boisterous weather with northeast winds, in May, off the sound. Vancouver had boisterous weather in June in the sound.

It is proper to make the following explanation of our knowledge of this extensive sound as nothing has been done since the time of Vancouver, who says the examination of the continental shores of the sound were completed, but the numerous islands, inlets, rocks, and shoals, which are contained within this space, being considered as secondary objects, did not fall within the limits of his service, of which the principal object was to survey the shore of the continent.

HINCHINBROOK ISLAND.

This island occupies the eastern part of the main entrance into Prince William Sound; the southeastern face of the island is a nearly straight line lying northeast half east and southwest half west for seventeen miles, broken by numerous small coves, but, so far as known, without affording any shelter. Puget lays down fourteen to nine fathoms two miles broad off the northeastern part of the island. The western face runs nearly north for fifteen miles indented by Port Etches. Johnstone says that in passing along the northwest part of the island "which in westerly direction is formed into coves and small open bays," he stopped in one of these bays and found a wooden cross erected on which was inscribed "Carolus IV Hispan. Rex. A. N. 1790 P^{r} D^{n} Salvador Fidalgo." This would appear to be about four miles east of the northwest point where he observed the latitude 60° 30′, almost the same as given by Tebenkoff. The northwest point of the island having remained without any designation, the United States Coast Survey has named it Johnstone Point. The north side of the island lies nearly east and west for seven or eight miles to the mile-wide passage between it and the southwest end of Hawkins* Island. This passage leads south for three miles to a large bay in the northeast side of Hinchinbrook Island, with soundings in from two to five fathoms. The northeast extremity of the island is a sharp narrow point named Point Bentinck,† to which stretches the southwest-

* Portlock named this Rose Island in 1787.

† Named by Vancouver, 1794; it was named Point Steele by Portlock, in 1787.

ernmost part of the Copper River flats. This point lies in latitude 60° 27′ according to Tebenkoff; and five or six miles to the northeast by east-half-east lies Point Whitshed,* while between these two lies a "low, uninterrupted, barren sand as far as the eye could reach" from Johnstone's boat. This bank seemed impassable at low water, but some of the Russian boats have passed through channels at high water. Looking from Point Bentinck the space toward Point Whitshed was occupied by a tremendous surf in boisterous southeast weather.

We have no description of the physical appearances of this island; on Tebenkoff it is laid down as high and presenting a mountainous ridge towards the ocean, with the lower parts exhibiting a growth of spruce. The Esquimaux name of the island is Khtagaliouk, by which it is known on Russian maps; Grewingk calls it Nutschek, which is the Indian appellation.

ENTRANCES TO PRINCE WILLIAM SOUND.

The eastern and usual entrance to this sound is about six miles wide between Cape Hinchinbrook on the east and Point Zaikoff† on the west. The tidal currents run about three miles per hour; much fog is reported by the Russian navigators to prevail about the entrance. The depth of water in the channel is great—Belcher has one hundred and six fathoms one and a half miles west of the cape. The approaches to this entrance are in part obstructed by the Seal Rocks described on another page, otherwise the approaches are bold and the coasts east and west for fifteen or twenty miles free of known dangers. Twenty-two miles southeast by east one fourth east from Cape Hinchinbrook, soundings in thirty-eight and forty fathoms are laid down by Vancouver. The middle entrance is between Montague Island on the east and Latouche Island on the west. The width of the entrance between their southern points, which lie northwest three-quarters north and southeast three-quarters south from each other, is about nine miles wide, but decreases to three about ten miles inside. Strong tidal currents of three and four miles per hour pass through this passage, off the entrance of which Portlock found sixty-five fathoms mud, when Cape Clear bore about east three-quarters south, seven or eight miles; when the cape bore about east by north half north, distance six miles, he found forty-three fathoms over gravel, small stones, and shells. No known dangers exist off this entrance, and the headlands are bold; the weather is generally unfavorable, and the channel inside has numerous dangers for a sailing vessel. Vancouver says that from the number of rocks which he discovered in this passage between Montague and the Green Islands navigation is infinitely more intricate and unpleasant than had been imagined from the accounts of Cook, Portlock, and others.

The other entrances to the sound are the narrow one to the west of Latouche Island, described on another page, and the wider one, five miles west, between Point Elrington on the east and Cape Puget on the west. We know little of

* Named by Vancouver, 1794.

† Named by the United States Coast Survey in 1868.

them. The former was traversed by Hayward in boats between Port Etches and Cook's Inlet, and called Prince of Wales Passage.

*CAPE HINCHINBROOK.

This cape is the south point of Hinchinbrook Island, and the eastern point of the principal entrance to Prince William Sound.

The southeast extremity of this cape is north 65° west, distant sixty-four miles from the south point of Kayak Island, and is designated the Ocean Cape on Tebenkoff's chart. It lies in latitude 60° 16′, longitude 146° 47′. From this point the shore stretches west-northwest and then northwest for three miles to the entrance to Etches harbor, (Nutchek, of the Russians.)

From this cape the Seal Rocks, directly in the approach to the entrance of Prince William Sound, lie seven miles south 50° west, according to Vancouver.

SEAL ROCKS.

A group of small rocky islets lies off Cape Hinchinbrook, on the prolongation of the southeast shore of the island, and seven miles south 50° west from the eastern part of the cape; and also seven miles broad off the southeast shore of Montague Island. In this vicinity of much fog they form a dangerous impediment, directly in the mid entrance to Prince William Sound. Tebenkoff has a view of them when bearing north 20° west, distant three miles, when two large rocks show towards the west on the group and numerous small ones to the eastward. He has their position properly placed on his chart, but does not refer to them in his description. Vancouver describes them as a "barren, flat, rocky islet with several rocks lying at a small distance from it." Cook first discovered them, but did not place them on his chart.

PORT ETCHES OR NUTCHEK BAY.

This bay lies in the southwestern part of Hinchinbrook island and opens directly upon the narrowest part of the entrance to Prince William Sound. The south point of entrance is situated in latitude 60° 16′,† longitude 146° 56′ according to Chornoff and Belcher, although Tebenkoff places it in latitude 60° 18′, longitude 146° 54′. It has very bold water close to it. Belcher has one hundred and six fathoms a mile and a half west-northwest from it; he anchored close under the bluff in seventeen fathoms. The immediate shore is bold and rocky. The point to the northward of Port Etches is distant three or four miles north by west, and named *Medvieje* or Bear Cape. The nearest shore on the opposite side of the entrance to the sound is Point Zaikoff, distant six miles west-northwest.

Two miles inside the southern point of entrance to the bay, Cook anchored during a thick fog in a small cove about a quarter of a mile off shore in eight

* Named by Cook in 1778; on his chart it is Hinchingbrook; in the text Hinchingbroke. The present spelling is Vancouver's.

† Vancouver placed it in latitude 60° 16′.5.

fathoms over muddy bottom. This cove lies nearly three miles south by west from Fort Constantine. Cook gives a view of the country from this cove; high mountains in every direction, and covered with patches of timber and snow. The northern part of the entrance is occupied by a mass of rocky islets, named the Porpoise or Bird Rocks, nearly half a mile in extent, described by Cook as "rocky islands," and having twenty fathoms close to their south faces according to Belcher. The space between them and the northeast shore has not been sounded. They lie north by east two and a quarter miles from the south point of entrance, and one mile and a quarter southwest by west from Fort Constantine, and on the prolongation of the high ridge terminating at the fort. Between these rocks and the south shores the soundings range from sixty to thirty fathoms. The nearest southern shore from the Porpoise Rocks lies southward one and a half mile, and this may be considered the available width of the entrance.

The south shore of the bay, indented by two or three small coves, is nearly straight from the outer point to the head, a distance of eight miles on a northeast by east course; the bay has the same direction as the south shore, and one mile northeast by east from the Porpoise Rocks is Point Barber* on the north shore. This point lies north-northeast three and a half miles from the south point. The north shore commences from this point to run on the same general course as the south shore, gradually, however, approaching it at the head. Two miles northeastward from Point Barber on the north shore a large bay indents the shore, and receives the waters of an extensive lagoon through a very narrow channel.

The southeast shore is bounded by high mountains, skirted along the immediate shore with a narrow belt of wooded land.

The Russians have an anchorage in Garden Cove on the southeast shore, one and a half mile from the head of the bay and two and a half miles east-southeast from Point Phipps, with two small streams entering it. It appears well protected and has regular soundings in five and four fathoms. Portlock anchored here in 1787, in five fathoms muddy bottom, and called the island protecting it Garden Island, because he planted a variety of garden seeds upon it; the western rocky point he named Point Horn.* This anchorage affords an abundance of muscles and crabs; and in the bay abreast of it he caught abundance of fine cod and halibut, and even caught them alongside the vessel. With the same he caught hogsheads of small but very good herring. Sometimes took two thousand salmon at one haul of the seine, and they were in such quantities that any quantity might have been taken, (June 11.) Two small streams enter this cove. In this cove he cut good sticks for spare topmasts, mizen-mast, and mizen-yard. On Garden Island Portlock lopped off all the branches from the highest tree on the island and fixed a staff about ten feet long at the top with a wooden vane on it, and near the bottom was inscribed the ship's name, with the year and day of the month. Belcher found this tree in 1837, with the inscription, "Port Etches, ship King George, Nath. Portlock, Commr., July 22 1787."

* Named by Portlock, 1787.

The northwest shore is bold, and for the first two miles east of the fort is formed by the southeast face of a high peninsula, terminating at the northeast by Cape Phipps, where a narrow channel separates it from the main and gives passage to a large inner bay or lagoon, the head of which stretches southwest towards the sound, from which it is separated by a beach only a few hundred yards wide. This lagoon is about two miles long and nearly one wide, with shallow water occupied by flats, but affording a channel of twelve feet water nearly to Fort Constantine, which lies north only two-fifths of a mile from the north point of the entrance to Etches.

Where the passage leads from Port Etches to Constantine or Brooks* harbor, as the lagoon is called, the shores recede and form a bay a mile wide, northeast and southwest, and nearly three-quarters of a mile deep, with anchorage in from five to seven fathoms of water half a mile from shore, and over very even bottom. A small stream empties from the north into this indentation north of the above rocks. At the above anchorage a vessel lies apparently too close to the islets for a comfortable berth if a southeaster springs up suddenly. Belcher says that he anchored in seven fathoms when the islets bore north and the western shore bore southwest half west, and the nearest bluff land to the west one-third of a mile distant; and that when it blew hard the vessel brought home her anchor. In looking into the port with a fresh northeast breeze, the soundings on both shores gave twenty-five, thirty, and forty fathoms at every tack, close in shore and almost touching the rocks.

The English chart by Belcher gives a depth of two and a half fathoms as the least water into Constantine Harbor, but a rock having only four feet at low water is laid down in mid-channel on the Russian survey by Chornoff. The current through the strait, which is only two hundred yards wide, sometimes runs four knots per hour. In the outer bay they are also quite strong, and the rise and fall of tide is stated to be nine and a half feet; but with southerly winds and in the autumn Tebenkoff says they rise even fifteen feet. The time of high water at full and change is given 1*h.* 15*m.* by Belcher.

The geographical position of Fort Constantine from the mean of the observations of Chornoff and Belcher is latitude 60° 20′ 15″ (differing only 6″) when reduced according to Russian manuscript survey,) and the longitude 146° 52′ 42″, being the mean of Russian and English determinations from Sitka applied to the Coast Survey determinations of Sitka. Magnetic variation in 1837 was 31° 38′ east. Chornoff gives 31° east, in 1830.

Fort Constantine serves as a defense of the Chugach Indians against the encroachments and attacks of the Koloshes and Ugalense.

Belcher says that in 1837 the houses of the company were included within a substantial wooden quadrangle furnished at its sea angles with two octagonal tur-

* Named by Portlock, 1787. He named Port Etches after Richard Cadman Etches, one of the merchants composing "The King George's Sound Company," for carrying on a fur trade from the western coast of America to China.

rets capped in the old English style, and pierced with loop-holes and ports. The summit of the line of the stockade is armed with spikes of wood; and the walls of the stockade are eighteen inches thick and well calculated to defy musketry.

Of the climate of Port Etches, Portlock says that when he anchored in Garden Cove, May 16 1867, the land around had a dreary appearance, being covered with snow five or six feet deep quite down to high-water mark, so that the only space where the crew could walk was on the beach at low water. In June he planted many garden seeds on the small island, so that the snow was gone before the middle of the month. June 19, he says the surrounding country wore a different aspect from what it did at their arrival; the heavy rains had melted most of the snow, and everything seemed to promise the speedy approach of spring. By June 24, parties who ascended the highest hills in the neighborhood found a variety of flowers in full bloom.

He found "wild wheat" just above the beach between the cove and a fresh-water lagoon that empties itself by a small stream at the north part of the beach. This wild wheat is an *elymus* with an ear somewhat like wheat, a strong wheat-like stalk and leaves, and a grain attaining at Kadiak and Unalaska the size of an oat grain. The country abounds in pine trees, some very large alder, a kind of hazel, but only large enough for handspikes. Berry bushes are in great abundance and variety, but not ripe July 31. Among numerous vegetables and plants he notices the wild pea, doubtless the *pisum maritimum* which we found at Unalaska, and is distributed as far north as 64°. The surrounding country, after the snow left it, which was about the middle of June is quite pleasant; and the weather at times, long before that period very fine and pleasant, but at other times exceedingly boisterous with constant rain, which, however, dissolves the snow, when the plants immediately spring forth. He recommended West or Brooks Harbor as the site for a settlement.

Belcher, in 1837, notices the above-mentioned patch of wild grain, and found strawberries and other berries in tolerable profusion without searching for them.

SNUG CORNER BAY.

Twenty-four miles north of the entrance to Port Etches, and fourteen miles north by west three-quarters west from Johnstone Point, lies a small island about one mile in extent, and lying off the western point of the peninsula between ports Fidalgo and Gravina. The channel between this island and the peninsula is about a mile wide and "scattered over with many rocks." The northern point of this island lies about two miles southwestward from the west point of Snug Corner Bay. This harbor lies open to the northwest; the entrance about two miles wide, and the general direction of the bay southeast, with some rocks and an islet laid down on the eastern shore. Cook says it is "a fine bay or rather harbor;" he beat into it in a thick fog, with excessively hard squalls and rain, and of course saw nothing but the shores of the bay. In passing the island off the peninsula he had a depth of twenty-six fathoms over a muddy bottom; soon after-

wards the depth increased to sixty and seventy fathoms over rocky bottom; but in the entrance to the bay the depth was from thirty to six, the last being very near the shore. He was unable to get as far in the bay as he wished, and anchored in thirteen fathoms. The head of the bay is sheltered from all winds, with a depth of water from seven to three fathoms over a muddy bottom. The land near the shore is low, part clear and part wooded. The clear ground was covered (May 16 1778) with two or three feet thick of snow, but very little lay in the wood. The very summits of the neighboring hills were covered with wood, but those farther inland seemed to be naked rocks bound in snow. The west point of Snug Corner Bay is placed in latitude 60° 45½′ and longitude 146° 55′.

He gives a view of Snug Corner Cove, a magnificent scene of desolate grandeur rising precipitously from the margin of low ground. Vancouver says that Snug Corner Bay and the passage thereto from the ocean seem to be less liable to dangers from shoals and rocks than all the places of shelter the sound affords. There were no natives in the bay.

It would serve no good purpose to describe the numerous ports, peninsulas, islands, and channels of Prince William Sound, they are only described in general terms by Vancouver from boat expeditions undertaken in bad weather. The atlas of Tebenkoff gives all the particulars that can be gleaned from the generalities of old navigators.

ZAIKOFF BAY.

Tebenkoff has two large indentations in the north end of Montague Island; the western one is evidently unexplored, and the eastern one, with rocks and an islet on its east shore, lies abreast and west of the entrance to Port Etches. It lies broad open to north; no soundings are laid down. Its eastern point has been named Port Zaikoff by the Coast Survey, and lies west-northwest, six miles from the south point of the entrance to Port Etches.

MONTAGUE ISLAND.

This large and high island may be said to lie broad in the entrance to Prince William Sound, with passages thereto at the northeast and southwest extremities of the island. It is forty-five miles long, with an average width of seven miles, and lies northeast by north and southwest by south, its southern point, Cape Cleare, stretching well out into the Gulf of Alaska, and situated in latitude 59° 46′, longitude 148° 01′. The northeastern point lies abreast of the entrance to Port Etches, about six miles distant, forming the west point of the principal entrance to the sound, and through which the currents rush very strongly. The currents through the entrance west of the southern extremity of the island are represented as running three and four knots per hour, and quite irregularly.

The immediate shores of the island are well-wooded, and much lower on the northwestern side than on the eastern. The island is represented as high, and Vancouver, when at anchor under the western shore about twenty-two miles from

Cape Cleare, was effectually screened from a very heavy gale by the "lofty mountains that compose the island."

On the northwest shores are two or three open anchorages, protected from the heavy southeast winds by the high lands to the eastward.

Off a low projecting point, covered with wood, on the southeast face of the island, fifteen miles from Cape Cleare, lies a group of six small rocky islets, known as the Wooded Islands on the Coast Survey chart, and as the Little Islands on Tebenkoff. They are composed of steep cliffs, nearly level on their tops, and may serve as a guide in thick or gloomy weather. They are tolerably well wooded, and thereby not liable to be mistaken for the Chiswells, which are entirely barren. This is Tebenkoff's opinion, but the Chiswells lie nearly sixty miles to the west-southwest. In his map, Portlock places a line of rocks and soundings in four to eight fathoms one mile off Cape Cleare, designating them as "coral rocks." Dixon gives a view of Montague Island. Cook named this island in 1778. The Indian name is Tsukli, by which it is known on the Russian charts. Cook passed out through the channel on its west side, and remarked that in this channel are several islands. Those that lie in the entrance, next the open sea, are high and rocky. But those within are low ones; and being entirely free from snow, are covered with wood and verdure, and on this account were called Green Islands. They lie three miles west of the northern part of the island.

CAPE CLEARE.

This is the southern head of Montague Island, but no description of it appears in any of the old navigators. It is situated in latitude 59° 46′ according to Portlock and Vancouver, longitude 148° 01′ according to Tebenkoff's chart; and Portlock lays down "coral rocks" one mile off its extremity with soundings in four to eight fathoms. From this point Cape Puget lies north 58° west, distant eighteen miles, while between them lie two large islands, with passages upon either side of them into Prince William Sound. One of these is described under the heading of Khlikathlik or Latouche Island; the peculiarities of the others are unknown except from the general descriptions of Vancouver. Twenty-eight miles south of Cape Cleare Portlock found seventy-six fathoms over muddy bottom. The water off the coral rocks appears to be of good depth; Portlock found forty-three fathoms over a bottom of gravel, small stones, and shells, when the cape bore east by north half north six miles, and deeper water towards mid-passage over a bottom of mud. (See remarks on the entrances to Prince William Sound.)

Vancouver anchored under the Montague shore in twenty-one fathoms, about five miles inside the southern visible part of the island. At this anchorage he says the vessel was one mile from the nearest shore, which bore south 53° east, (compass,) while the southernmost point bore south 30° east about three miles. Here a very heavy swell rolled into the channel round the south point of Montague Island. He says that between this anchorage and Point Basil no

bottom could be found with sixty to eighty fathoms of line within a mile of Montague.

Six or seven miles inside of Cape Cleare, the Russian charts have a bay two miles in extent, open to the west, but no soundings are indicated; Vancouver has the same indentation, and the Russians appear to have bodily taken his survey of this sound as the basis of their charts.

Fifty-four miles south 27° east from Cape Cleare, Portlock has a sounding in ninety-five fathoms over muddy bottom; and south 25° west from this cape he gives one hundred and ten fathoms over muddy bottom.

From the cape the eastern of the Barren Islands in the entrance to Cook's Inlet, is distant one hundred and twenty-seven miles south 67° west.

*MACLEOD HARBOR.

This bay is situated on the northwest shore of Montague Island, about ten or twelve miles within the southwest point of the island, and nearly abreast of the island Latouche, that forms the west side of the channel. Portlock says that after a boat examination he hauled in for it, and anchored in twenty fathoms, over a muddy bottom. In running into the bay, just off the south point, the soundings were seven and eight fathoms, over a bottom of black mud and sand. This bank appeared nearly across the mouth of the bay, and, after passing it the water deepened to twenty-one fathoms; and with this depth the south point of the entrance bore southwest by south about one and a half mile; the north point bore northwest by west half west about one mile; and the distance from the nearest northern shore was about a mile.

His rough sketch of this bay shows that it lies about northeast by east for three and a half miles, with irregular soundings from the seven-fathom bar across the entrance to twenty-two fathoms in spots, and carrying ten fathoms to the head. In the extreme northeast part is a small indentation, half a mile in extent, with four and a half to six fathoms water, and a stream flows into the eastern part of this cove. The whole east head of the harbor is an extensive flat. A vessel can lie in the cove in four and a half to five fathoms, about a cable's length from shore, with the south point of the harbor just shut in by the point forming the cove. This point may be taken close aboard, as the water is quite bold.

Portlock says that all vessels coming into this harbor from the southward ought to keep the shore of Montague Island as close aboard as possible, for if they get off into the channel and over toward the western shore they will bring sixty, seventy, and eighty fathoms of water, and that depth too close in-shore for anchoring.

The south point of the entrance was named by Portlock, Point Bryant; the northern, Point Woodcock; their distance apart about two miles, bearing northeast by north and southwest by south.

* Named after Portlock's first mate.

The only wind to which this bay is exposed is from the southwest, and then a vessel may run up into the cove and anchor in four and a half fathoms.

The south point of the harbor is placed in latitude 59° 58′, longitude 147° 54′, by Tebenkoff. Vancouver placed the north point, which he named Point Basil, in latitude 58° 01′, but he does not appear to have had any observations, as the weather was very bad. (See remarks under Henning Bay.)

From Macleod Harbor, in sounding across the channel towards Latouche Island, fifty and sixty fathoms are found over a muddy bottom soon after quitting the harbor; no bottom in mid-channel with seventy fathoms. Close to the shore of Latouche Island, within a cable's length, the soundings are from forty to fifty fathoms, and these are carried to the extreme north of the island.

Vancouver says he found tolerably good soundings on the Montague side of the channel northward of Point Bazil or Woodcock, and in a violent squall anchored in fifteen fathoms about seven miles northwest of that point and a mile from shore, according to his chart. In that situation he lays down a rock two miles to the west-northwestward, and about six miles east by north half north from Point Grace, the northern extremity of Latouche Island.

Portlock examined the western shore of Montague northward from Macleod harbor, and says he found a bold shore with anchorage in thirty fathoms over a muddy bottom about a mile from land.

Between Point Basil and the southern part of Montague, Vancouver says no soundings were had with sixty and eighty fathoms of line a mile from shore.

HANNING BAY.

Northeastward from Macleod harbor the shores of Montague Island are bold, with soundings of thirty fathoms over a muddy bottom, about a mile from land. About five leagues from Macleod Harbor, Portlock says he came to a deep wide bay, where vessels may safely ride at anchor in from twenty to ten fathoms, muddy bottom. With ten fathoms the anchorage is near the bottom of the bay, and about half a mile from shore, but the best anchorage seems to be nearest the south side, and no nearer the shore than in from ten to twelve fathoms water. A fresh-water stream enters into the south part of the bay, where Portlock drew his seines, and in one tide caught a quantity of salmon sufficient to load two boats.

In the above position this bay has no existence in Vancouver or Tebenkoff charts; and in Portlock there is only a broad indentation of the shore. But in his general chart Portlock places Hanning Bay five miles northeastward of Macleod Harbor and about fifteen from Cape Cleare. Vancouver says that Whidbey visited Hanning Bay and Macleod Harbor, and "represented them as very much exposed; constituting, in fact, nothing more than stopping places in navigating this channel. The points of both ought not to be approached too near, as lurking rocks are situated at some distance from them."

This bay was named by Portlock after one of the officers of the King George's Sound Company.

GREEN ISLES.

They lie four miles westward of the northern part of Montague Island, and the soundings in the channel to the sound vary from thirty-five to twenty fathoms, until nearing the Green Isles, when the water shoals, and frequently seven and eight were found by Portlock, with rocky and shell bottom. Patches of kelp were numerous near the shoal soundings.

A line of rocks extends from the north point of the Green Isles to a small island about six miles north of it; but it is not known whether it is a continuous reef, although Portlock's track would indicate a passage through it. Another line and an islet extends five miles south of the southern extremity of the island; while a patch, with one above water, is laid down two miles southwest from the southern part of the Green Isles.

The indications of rocks about the Green Isles are so numerous, from the short experience of Cook, Portlock, Dixon, Vancouver, and others, that it is advisable to work on the Montague side of the channel, within a distance of three or four miles from the shore south of Port Chalmers.

Vancouver lays down the Green Isles as one; Portlock makes three, lying parallel with the west coast of Montague Island.

CHALMERS BAY.

On the northwest shore of Montague Island, eight miles from the north point, between three and four miles southeast of the easternmost point of the Green Isles, and the same distance east of the "Rugged Rock," lying in the passage near the shores of the Green Isles, lies this port, broad open to the northwest. The shore of Montague Island is here broken by several points and marked by islets and rocks. Portlock applied the name Chalmers Harbor to a restricted part of this broken shore, and Vancouver to the same part, with the addition of another bay to the southwest, applied the term Port Chalmers. The proper designation should be Chalmers Bay, and this would lie east of the northeast and southwest points, which are laid down five miles north 28° east and south 28° west of each other. The northeast point, named Stockdale Point by the Coast Survey, would lie, according to Vancouver's sketch, three and a half miles north 78° east from the easternmost point of the Green Isles; and the southwest point four miles south 16° east from the same. From the line joining the northeast and southwest points of the bay, the Chalmers Harbor of Portlock lies two and a half miles to the eastward, and nearly midway between them. The approaches to this harbor are marked by numerous dangers and it is advisable to approach it at low tide if practicable. Three-quarters of a mile west-southwest from the north point lies the North Passage Rock of Vancouver, covered at high water, with five to ten fathoms close to it on the north, west, and south sides, but a reef one-quarter of a mile east of it close to the point, between it and the above rock, Vancouver gives four to ten fathoms. From North Passage Rock the north point of Chalmers Har-

bor bears south 26° east, two and a half miles distant, with a broad shoal off the point for a quarter of a mile. The best directions to reach the harbor from the north would be to run from the outside of the North Passage Rock to Point Gilmore, the north point of the harbor, pass the point above a third of a mile west of it, and when its south tangent bears east run for it, carrying ten fathoms close to it.

If coming from the southward, run up under the Montague shore until the south point of Green Isles bears south of west, then keep towards the western shore, but on the east side of "Rugged Rock," lying about three miles southwest by south three-quarters south from the easternmost point of Green Isles. Mid-passage between this "Rugged Rock" and the east shore lie two dangerous sunken rocks. Vancouver beat northward between these rocks and "Rugged Rock" with twenty fathoms, and Whidby beat between them and Montague Island with eight to fifteen fathoms. These rocks lie about northeast half north and southwest half south three-quarters of a mile from each other; the southern bearing south 68° east, one-half mile from "Rugged Rock;" the northern one east, one and three-quarters miles from "Rugged Rock." Vancouver says: "We suddenly came upon the southernmost of these rocks in a depth of nineteen to six fathoms, without any kelp or other indications of shoal water; on the northern one, which shoaled equally quick, there was a small patch of kelp growing in three fathoms, with five to seven fathoms close around. Each of these appeared to occupy no greater extent than the ship's length in any direction."

The south point of Chalmers Bay bears west by south three-quarters south nearly three miles from "Rugged Rock," but Vancouver lays shoal ground half a mile off the point to the northwest, although the soundings a mile southwestward of it are thirteen one-third of a mile off shore. No soundings are laid down for any other approach than by the north passage, although the indications look favorable. Two large islets lie northeast of the south point, stretching towards a "woody islet" from which the location of the other dangers may be determined in approaching the harbor. This "*Woody Islet*" lies three miles south of the North Passage Rock, and three-quarters of a mile from the eastern shore, with fifteen fathoms water between it and the southern and eastern shore. A "detached rock" lies a quarter of a mile southeast of Woody Islet. A patch of rocks lies between this detached rock and Point Gilmour, about one-third of a mile from the rock; a second patch lies half a mile northeast by north from Woody Islet; a third patch half a mile north of Woody Islet. A depth of six or seven fathoms lies between these patches and the islet, with four fathoms close to the latter. If the passage is clear to the west of Woody Islet, then a vessel may enter by running close along the north side of Woody Islet towards Point Gilmour on a northeast by east course; this will carry her midway between the first and second patches of rocks, and when half-way between the islet and point, run east under the south side of the point. Three-quarters of a mile north 15° west from Woody Islet is the *South Passage Rock* of Vancouver; it covers at high water, and

has three fathoms close to it. It lies a little over one mile west of Point Gilmour; if it is visible, run for Point Gilmour in eight and ten fathoms, leaving this rock not over a quarter of a mile south of the course, and thus avoiding *Discovery Rock*, on which Vancouver's vessel grounded. This rock lies north 6° east, one mile from Woody Islet, and north 72° west, one mile from Point Gilmour. It has ten fathoms close around it, and was not marked by kelp; it has less than two fathoms upon it; at low water the vessel had two fathoms at her bows, five fathoms at her main chains, and seven fathoms astern. A fourth rock was discovered half a mile northward of the latter, with seventeen fathoms between them; it lies one mile north from Woody Islet, one and a half mile north 50° west from Point Gilmour, and one and a half mile south from the North Passage Rock off south point of Stockdale Bay. It has seven fathoms close to it, and seventeen fathoms between it and North Passage Rock. It has four fathoms upon it at two-thirds flood tide, with seven fathoms close to it.

It will be seen from the foregoing description that four rocks lie nearly in line northward of Woody Islet and towards North Passage Rock; to the westward of this line the currents through the passage run three miles per hour, and in about mid-passage Vancouver found eighteen fathoms.

The anchorage of Chalmer's Harbor may be described as follows, following Vancouver's sketch instead of Portlock's: It lies between Point Gilmour on the north, and Wilby Island one mile to the south of it, with twenty-one fathoms muddy bottom between them. The former lies a little over a mile northeast by east from Woody Islet; the latter one mile east by south from Woody Islet. From this entrance the bay stretches one and a half mile east-northeast, diminishing gradually in breadth, and having rocks and a broad strip of shoal water on the south. About half a mile eastward of Point Gilmour a narrow low point makes southward a quarter of a mile from the south shore and forms a "land-locked cove" to the eastward of it half a mile square in extent, "with capital anchorage in seven fathoms over muddy bottom." Vancouver anchored about a quarter of a mile east of this small low point, upon which he made his observations. For future reference, and to mark a peculiar feature connected with this point, it has been named by the Coast Survey "Sinking Point."

Vancouver says of this inner anchorage, that it can "only be considered a small cove in a rugged, rocky coast, very difficult of access or egress." Portlock removed the stones from the beach, then beached and cleaned both his ships. He says that it would not be prudent for any vessel to run in north of Woody Islet in thick weather, but when the weather is clear it is tolerably safe, with a good look-out, the lead going, and keeping nearly in mid-channel.

One mile southwest quarter south from Woody Islet lies the northernmost of two large islets, running northeast from the south point of the bay, and the space between them and the eastern shore, three-quarters of a mile distant, appears a better temporary anchorage than Chalmers Harbor. The soundings appear uniform at fifteen fathoms, gradually decreasing one-third of a mile from

the southeast shore, to which three fathoms can be carried within a quarter of a mile. Southward and westward of the southern island a deep cove enters, with shoal water; but a vessel may lie in eight fathoms close under the eastern shore with the south island bearing northwest by west, and Woody Island a little west of north; this *South Cove* would then be open to the northwest, but no soundings are given westward or northwestward of the south island.

The geographical position of "Sinking Point" where it joins the main shore was determined by Vancouver, latitude 60° 16′, longitude from Tebenkoff's chart 147° 21′. In June, 1794, Vancouver found the magnetic variation 28° 30′ east. From his sketch Point Gilmour is in latitude 60° 16′; Portlock placed it in 60° 17′; the north point of the bay is in latitude 60° 18½′; the south point 60° 16′. While anchored there, from May 26 to June 10, he observed a considerable difference between the night and day tides; the former, during the springs, rose thirteen feet four inches; whereas the latter did not rise more than twelve feet one inch; and it was high water about an hour after the moon had passed the meridian.

After Vancouver got his ship off Discovery Rock he anchored half a mile west-northwest from it in twenty-one fathoms over muddy bottom, with Woody Islet bearing south by east one and three-fourths of a mile, Point Gilmour south 51° east one and three-fouths of a mile, and the north point of the bay northeast three-quarters north one and three-fourths of a mile. In this position a "few cod and halibut were taken during the night." Vancouver has a sketch of this harbor; Portlock has an inferior one.

Vancouver says that about Chalmers Bay the country, as high up the sides of the mountain as vegetation extends, was in most places free from snow before June 10. From its diversity in surface, and spaces clear of trees, it presented a very pleasing verdant appearance, but these clear places were a perfect sphagnous morass, frequently composing the sides of hills. The trees were not large. "The shores are in general low, and the sea appears to be making rapid encroachments upon them. Many trees had been cut down since these regions had been visited by Europeans; this was evident by the visible effects of the axe and saw, which we concluded had been produced whilst Portlock and Dixon were here seven years before,* as the stumps of the trees are still remaining on the earth where they had originally grown, but were now many feet below high-water mark, even of neap tides. The narrow, low, projecting point (named Sinking Point) had not long since afforded support to some of the largest pine trees in the neighborhood, but it was now overflowed by every tide; and excepting two of the trees, which still put forth a few leaves, the whole were reduced to naked, dead, white stumps, by the encroachment of the sea water to their roots; and some stumps of trees, with their roots still fast in the ground, were also found in no very advanced state of decay nearly as low down as the low water of spring tides."

* Not improbably the work of the Russians, who built ships in Chugach Sound long before Portlock and Dixon.—(DALL.)

Stockdale Harbor, of Portlock, lies immediately north of Chalmers Bay; Vancouver says it is "only a bay full of rocks, and not worthy of any particular examination."

Vancouver says that off the northwest point of Montague Island a ledge of rocks extends half a mile; but at half a league from the point he found sixty-five fathoms over muddy bottom; in his chart he places fifty-seven fathoms two miles west of that point.

LATOUCHE OR FOOT ISLAND.

On the west side of Montague Island, abreast of Port Macleod, lies the island Khlikakhlik,* or Latouche, of which the southernmost point, or rather the island off it, bears northwest three-quarters north ten or twelve miles from Cape Cleare. The channel on the west side of this island was partially examined by Sarytchef in 1790. Off the southern extremity of the island lies a moderately high islet about a mile long north-northeast and south-southwest, with a mile-wide passage between it and the south point of the island, but obstructed by a shoal in the middle. About three miles south by east from this small island Portlock had soundings in sixty-three fathoms over a muddy bottom. Between this small island and the shores of the island to the westward the entrance is four miles wide, but an unobstructed channel with twenty-five fathoms depth lies under the western shore. From the south end of the small island there lies a shoal at half a mile west, then a high solitary rock at one mile west; and, finally, a shoal stretching its western point to a distance of two miles west from the southern point of the island.

The general direction of the passage west of the Khlikakhlik Island is northeast by north for ten or twelve miles, decreasing from four to two miles in width; a few soundings indicating a general mid-passage depth of thirty-five and forty fathoms. At five and seven miles from the southern entrance are two small islands on the eastern side of mid-passage. Anchorage is laid down at the south entrance of this passage in fifteen fathoms under the western shore when the north end of the small island bears east-southeast; also under the eastern shore, close to the southwest point of Khlikakhlik Island, which bears south from the anchorage; no depth is noted. The latitude of this point was determined by Sarytchef as 59° 56′, and Tebenkoff gives the longitude 148° 14′. Two or three coves are noted on the eastern side of the passage, and anchorage marked in the cove east of the second islet inside in the passage; no soundings are noted. A small stream empties into the eastern part of the cove. On the western shore of the passage, abreast this cove, is the entrance to a large bay or passage, with numerous islands therein. The passage to the north of them has fifteen to twenty fathoms; and the first cove to the northeastward, about a mile inside, has ten and six fathoms laid down.

Along the northwestern side of Khlikakhlik Island, and either through its

* Named Foot Island by Portlock; Latouche by Vancouver.

western passage or through the second one west, Hayward (of Portlock's vessel) made his passages from Port Etches to Cook's Inlet, and named it Prince of Wales Passage.

The north point of Khlikakhlik Island was named Point Grace by Vancouver.

POINT ELRINGTON.*

This is the southern extremity of the middle of the three islands lying between Cape Cleare and Cape Puget; from the former it is laid down northwest three-quarters west fourteen or fifteen miles, and from the latter, east about four miles. It also forms the eastern point of the entrance to Port Bainbridge,* from which two passages lead into Prince William Sound. Vancouver describes it as a high, steep, barren promontory, of small extent, connected to the south end of the island by a narrow isthmus, and forming the "southwesternmost part of the high, rugged cluster of islands lying five miles east of it." This cluster is Latouche Island.

POINT PYKE.*

North of Point Elrington about five or six miles is the south point of an unnamed island. It is bold and rocky, with a number of islets lying off it, and was named by Vancouver, who states that it is remarkable for its sugar-loaf form. To the north of Point Pyke is a "tolerably well sheltered bay, surrounded on all sides by lofty, abrupt, snowy mountains." To the north of this there is a second bay, and also a narrow opening ten miles long to the northeast, leading to Prince William Sound.

PORT BAINBRIDGE.*

This arm of the sea has its southern opening, three miles wide, between Point Elrington on the east and Cape Puget on the west, and stretches in a directly north course for eighteen or nineteen miles, with an average width of two miles. Immediately inside the entrance on the eastern side, three miles north of Point Elrington, is Prince of Wales Passage, leading northeast to the north point of Latouche Island; about the southeast entrance to this passage are "many rocks about the shores just above water," and several islets laid down in mid-passage, but the western shore is compact, although indented by coves. Point Pyke has been described. Ten miles north of Point Elrington, on the eastern side of the port, is the narrow opening of a passage leading eleven miles north 50° east into Prince William Sound. This passage is something less than a mile wide; there are several sunken rocks in it, and the shores are composed of steep, rocky mountains. The northwest point of the north entrance of this passage was named Point Countess by Vancouver, and placed in latitude 60° 13′. Tebenkoff places the longitude in 148° 12′. Five miles northwest of Point Coun-

* Named by Vancouver, 1794.

tess lies the mouth of Icy Bay, to be hereafter referred to. The north point of the south entrance to this passage was named Point Waters by Vancouver, and marked by "some rocks and breakers before it." Ten miles north 15° west from Point Waters lies the head of the port, "with a small tract of lowland, off which, as well as off its western shore, lie some rocks and rocky islets, upon which, although eighteen miles from the entrance, the sea broke with such violence as rendered landing dangerous." The latitude of the head of this port is placed by Vancouver in 60° 13½′.

About two miles northeast from the head of Port Bainbridge Vancouver places the head of Icy Bay, which lies about four and one-half miles east and west, with a width of two miles. This bay "terminates in a compact body of ice that descends from high, perpendicular cliffs to the water side, and surrounded by a country composed of stupendous lofty mountains covered with snow," (June.)

CAPE PUGET.*

This cape, forming the western point of the entrance to Port Bainbridge, and the extreme southwestern point of Prince William Sound, is laid down by Vancouver north 63° west, nineteen miles from Cape Cleare; and by Tebenkoff north 60° west, nineteen miles. Vancouver placed it in 59° 55′, and Tebenkoff gives the longitude 148° 33′. No description of this cape appears among the old navigators, but Tebenkoff's map represents it as a bold, high, rocky head, with a face two miles long to the southeast, having a line of rocks in front, with an islet off the northeastern termination.

There is a glacier at the head of the bay just west; and in the second bay, seven miles westward, a large glacier comes down into the ocean, and is represented by the Russian navigators as a very beautiful and grand object, when seen in a clear day.

From Cape Puget the general trend of the coast forming the southeast shore of the Kenai Peninsula is south 62° west for one hundred and ten miles to the Tschugatz Island, forming Cape Elizabeth, at the entrance to Cook's Inlet.

KENAI PENINSULA.

The eastern shores of Prince William Sound form the northeast part of the peninsula of Kenai, and its outer or Alaska gulf shore commences with Cape Puget and terminates at Cape Elizabeth. The western shore of the peninsula is formed by Cook's Inlet.

From Cape Puget to Cape Elizabeth the shores are said by Tebenkoff to have been very well explored by the Russian navigators, searching for good harbors and shelter for the Russian whalers. Their reports show that the line of coast is broken by bays and coves, but none offering good anchorage, there being very close to the shores not less than thirty to fifty fathoms of water. The coast is

* Named by Vancouver, 1794.

very rocky, and steep and mountainous, yet covered with wood, while the ravines and gorges between the mountains contain in many places glaciers which stretch back from the heads of the bays even to the gorges descending towards Cook's Inlet.

From the isthmus between Passage Channel in the northwest part of Prince William Sound and Turnagain Arm in the northeast part of Cook's Inlet, the peninsula is one hundred and thirty miles long to Cape Elizabeth. The eastern part is traversed by a range of high, snow-clad mountains whose general direction is southwest by west and northeast by east, and which seems to be prolonged by the Barren Islands and the Kadiak Group. On the western flank of this range are great lakes fed by the waters of melting glaciers, and supplying streams emptying into Cook's Inlet. Across this range the Indians sometimes make winter journeys between Cook's Inlet and Resurrection Bay.*

DAY'S HARBOR.

This harbor is laid down on Tebenkoff about fifteen miles west from Cape Puget. The bay opens directly to the south, and inland northward five miles, with a short arm to the northeast. The eastern point is bold and rocky, and the south and western point is the extremity of the peninsula forming the western shores of this bay and the eastern shores of Resurrection Bay. It was named by Portlock in 1786, and the eastern point called Point Harman. From Point Resurrection the east point of the entrance of Day's Harbor lies north-northeast for seven or eight miles. Point Resurrection is laid down in latitude 59° 51′.5, longitude 149° 13′.4, according to Archimandritoff.

It is not described by Portlock, but was doubtless visited by his longboat on her trading trips from Prince William Sound to Cook's Inlet.

RESURRECTION BAY.

The southeast point of this extensive arm of the sea, from fifteen to twenty miles long and six to three miles wide, lies twenty miles west by south of Cape Puget, thirty-seven miles west three-quarters north from Cape Cleare, and nineteen miles northeast by north half north from the Seal Rocks off the Chiswell Islands. It was well known in the last century and selected as the future shipyard of the Russian-American Company; but it does not present the proper facilities, on account of the great depth of water, the severity of the climate, and the wild nature of the coast. In Vancouver's time four English shipwrights were conducting the ship-building of the company at this place.

By frequent explorations of the company officers the position of this bay is said to be well known, but no detailed description of it has been published. Tebenkoff represents the western shore as low, the head as shallow, with a glacier at the northeast part; the eastern shore as bold and rocky, and Cape Resurrection, the eastern point of entrance, as a long, moderately low, narrow point, but rocky

* See remarks on the Kadiak group as a prolongation of this peninsula.

and abrupt. Archimandritoff determined the latitude of Cape Resurrection 59° 51′.5, longitude 149° 13′.4.

In the southeastern part of the broad entrance to this bay Tebenkoff lays down three moderately large but low islands; the first three miles southwest by west from Cape Resurrection; the second two miles west by north from the cape, and the third about half a mile from the west side of the cape and two miles north-northwest from its extremity. Mile-wide passages are given between the islands. The Chiswells lie about fifteen miles to the southwest by south, with the very irregular peninsula of Ayalik and some islets between the Chiswells and the bay.

Resurrection Bay was named Port Andrew by Portlock, and doubtless visited by his longboat on her trading expedition from Prince William Sound to Cook's Inlet.

CHISWELL ISLANDS.

Forty-seven miles south 75° west from Cape Cleare, Tebenkoff locates the Seal Rocks, five miles outside of the Chiswell Islands. Thirteen miles south of Seal Rocks Vancouver obtained soundings in seventy-five fathoms, and Portlock gives eighty fathoms over a muddy bottom about twenty-two miles south by west from them; and eighty-three fathoms over muddy bottom, seven miles east from them.

Of the Chiswell Islands Vancouver says: "We passed them and found the centre of the southernmost group, the Seal Rocks, in latitude 59° 31′; from these the easternmost, which is a single detached rock, lies north 54° east about a league distant, and the northernmost, which the hazy weather permitted our seeing, having several less islets and rocks about it, lies north 15° east five miles distant. These were all we saw of the Chiswell Islands, which are a group of naked, rugged rocks, seemingly destitute of soil and every kind of vegetation. The southern group is named the Seal Rocks by Tebenkoff, and the middle and principal one of the five is placed in latitude 59° 34′, longitude 149° 33, but he does not place any detached rock a league to the northeast of them. What Vancouver called the Chiswells proper is in reality a group of islets and the broken and numerous points of two long, low, wooded promontories, stretching southward and forming Ayalik Bay, off which lie the Chiswell Islands, north by west five miles from the Seal Rocks. On the Russian charts the Chiswells are named the Ayalik Islands.

The large indentation of the coast forming the approaches to Resurrection Bay was named Blying's Sound by Cook.

AYALIK BAY

lies north and south with the opening guarded by the Ayalik or Chiswell Isles. Its whole length from the Chiswells is about sixteen miles, reaching latitude 58° 57′, with an average width of two or three miles, is nearly straight, but both shores

are remarkably indented with numerous coves and bays, in which no soundings are given. The opening to this bay is laid down to the eastward between the Chiswells on the south and the point three miles to the northeast, in latitude 59° 41′, about forty-four miles west one-half south from Cape Cleare. There is an islet laid down in the northern part of the bay, thirteen miles from the entrance, and one mile south of the bend to the westward. About midway along the west shore an arm enters to the northwest with a glacier at the head; a smaller glacier is laid down on the west shore between this bay and the head. At the head of the open bay, between the Chiswells and the bold rocky point six miles to the west of them, a glacier comes down to the ocean.

Southwestward of the Chiswells the coast presents a broken appearance, and is indented by several unnamed bays with glaciers at their heads.

PYE ISLANDS.*

Seventy-six miles south 72° west from Cape Cleare lie the Pye Islands, forming part of the eastern shore of the deep bay of Nuka.

There are three large islands in the group, and they lie nearly north-northeast and south-southwest of each other. The southern two are one or two miles in extent; the northern is six miles by three, and nearly divided in two. Between the islands, and between the northern one and the main passages nearly a mile wide, and lying east and west, passages are laid down by Tebenkoff, but no soundings are given, nor any remarks of their availability in his notes.

Vancouver says: "The southernmost part of the Pye Islands, in several points of view, forms a very conspicuous peak, and although not remarkable for its great height, yet from its singular appearance is not easily to be mistaken in the neighborhood, as it descends with great regularity from its summit to the water's edge. Its southern extremity, by our observations, is situated in latitude 59° 19′. He says that a group of rocks lying south 75° west, nearly four miles distant from the southernmost of the Pye Islands, must be very dangerous in thick weather, especially as at high water, during the spring tides, it is probably overflowed." Tebenkoff says the rocks lie south 60° west, six miles distant from the southernmost part of the Pye Rocks, and two and a half miles broad off the large rocky island forming the western side of the entrance to Nuka Bay. The approximate geographical position of the southern point of the Pye Islands, according to Archimandritoff, is latitude 59° 20′.4, longitude 150° 29′.4. About nine miles east-northeast from the southernmost of these islands, and five miles off the coast to the northwest, Vancouver found bottom in seventy-three fathoms. About twenty-eight miles to the east he found seventy-five fathoms, and Portlock obtained eighty fathoms over muddy bottom about twenty-five miles east-southeast from them.

*Named Pye's Island by Portlock in 1786.

NUKA BAY.

According to Tebenkoff's chart this extensive bay is about twenty miles long and from six to two miles wide. The Pye Islands form the eastern side of its entrance, and a large unnamed island, eight miles long north-northeast and south-southwest, with rocky, bluff shores, forms the western side of the entrance, which is six miles across and broad open to the south. The bay has a general direction north, but has several passages leading from it, and several larger arms. The passages among the Pye Islands have been referred to. On the western side a wide passage leads westward around the north end of a large island. On the eastern shore a large arm opens at the west opening of the north passage through the Pye Islands, and eleven miles from the southernmost of the group. It extends about seven miles north-northeast, is two miles wide, and has a great glacier at its head coming directly into the water. The main bay extends north-northwest from the point dividing it from the eastern arm, and has several large bays on either side. The direction of the bay for the last five miles is nearly northeast. The shores of the bay and arms are marked wooded by Tebenkoff, from whose general remarks of this and Resurrection Bay it is inferred that not less than thirty to fifty fathoms are found throughout them. Vancouver says the coast to the southwestward is in most places very mountainous and descends rather quickly into the ocean, except in those places where it is broken into valleys, some of which are extensive and gradually incline to the water side. These, in some instances, in the middle of May were buried in ice, and some within a few yards of the wash of the sea, whilst here and there some of the loftiest pine (spruce) trees showed their heads through this frigid surface. The whole of this exterior coast wore a more wintry aspect than the shores of Cook's Inlet in much higher latitudes. These observations of Vancouver are fully corroborated by the experience of the Russian officers in this vicinity.

PORT DICK.

Half-way from the Pye Islands to Cape Elizabeth the outer cape is called Point Gore, in latitude 59° 12′, longitude 150° 58′; and the two-mile wide entrance to the west of it is the opening to Port Dick, which runs northward ten miles, with a broad arm ten miles long penetrating to the west. The immediate shores of this bay are low and wooded with streams coming into the head of each arm, and no glacier laid down on Tebenkoff. No soundings are given in his notes. The west shore of the entrance is bold and rocky, with a reef and islets stretching half-way (six miles) towards the eastern of the Chugach Islands.

"The land forming its eastern point, which is a projecting promontory, appears at a distance like an island, when about half a league distant and bearing from north 42° west to north 2° east. Towards the sea it terminates in an abrupt cliff moderately elevated, and is connected to the mainland by a low peninsula covered with trees. The northwest side presented every appearance of affording

sheltered anchorage, and to that part of the bay most of the fleet, two hundred skin canoes and their four hundred Indians that had met in the fur trade, now repaired." (Vancouver.)

He gives a spirited view of this elevated cape and the scenery beyond. In 1786 Portlock named this Dick's Harbor and the east cape Point Gore, after two of the officers of the King George's Sound Company. His longboat doubtless visited it in her trading trips between Prince William Sound and Cook's Inlet, but he does not describe it. Vancouver placed it in latitude 59° 11′, longitude 150° 11′. Tebenkoff places it in latitude 59° 12′, longitude 150° 58′. From Point Gore, the southernmost of the Pye Islands bears north 62° east eighteen miles, and the south point of the easternmost of the Chugach Islands south 67° west fifteen miles.

CHUGACH ISLANDS.

Three large islands, from two to three miles off the southern extremity of the Kenai Peninsula, are disposed in a curve around it. The eastern and western are large, three or four miles extent, and lie twelve miles apart. The middle one is smaller, and lies half-way between them and a little to the southward. Three islets are laid down one mile off the western side of the eastern island; rocks above and below water one and a half miles off the west side of the middle one, and rocks one mile off the southeast face of the western one.

When Vancouver was about five leagues east-northeast from the eastern island, he says that a low, flat point projected towards the mainland. Tebenkoff does not so lay it down, but places some rocks a mile north of the island towards a very open, rocky bay lying three miles from the island. When Vancouver was five or six miles south 6° east (compass) from the eastern Chugach, he obtained soundings in seventy fathoms with sandy bottom. In this position the Barren Islands bore from south 55° west to south 34° west, distant thirteen miles. His bearings place him in latitude 59° 01½′, longitude 151° 30′. No detailed description of these islands nor their elevation is given in the old navigators or explorers, but Tebenkoff represents them on his chart as high and bold. They form the northeast shore to the entrance of Cook's Inlet, with Point Banks of the Kadiak group for the southeastern shore of the entrance, and the Barren Islands between them.

Tebenkoff places the southern point of the east Chugach Island in latitude 59° 6′, longitude 151° 25′. From it the eastern of the Barren Islands lies south 64° west, distant seventeen miles, and the middle Chugach west by south, distant five miles.

CAPE ELIZABETH.*

The termination of the Kenai Peninsula is "composed of high land," visible over seventy miles; directly off it lie the three islands named the Chugach. The

* Named by Cook in 1778 after the Princess Elizabeth.

western point of the western Chugach is named Cape Elizabeth, which Cook describes as a "lofty promontory" situated in 59° 10′. Puget saw it from a distance of sixty-three miles, when he was ten miles northwest of St. Augustine Island. From the center of the island the easternmost of the Barren Islands lies south 17° west, distant ten or eleven miles, with strong currents and a deep channel between them; nearly in mid-channel Tebenkoff gives ninety-five fathoms over sand and pebbles. He places Cape Elizabeth in latitude 59° 09′, longitude 151° 51′. In the strait between the western Chugach Islands and the main or Kenai Peninsula there is a good anchorage and shelter, according to Portlock, whose boats traversed all these waters; but Vancouver doubts the existence of a channel to the southward and eastward through these narrow straits, as he discovered some low, lurking rocks, which had the appearance of being connected with a cluster of rocks above the surface of the sea, lying from the cape south 50° east, at the distance of three or four miles.

It is important this locality should be examined, on account of the possible development of coal in this vicinity and the extraordinary numbers of whales visiting this neighborhood. (See remarks upon the fisheries on another page.) Portlock says the whales on the coast are close in shore and in vast numbers. Moreover, these narrow straits may be available for the passage of small vessels and steamers when the tide rips are dangerous in the main straits. From Cape Elizabeth Point Banks bears south 29° west thirty-one miles, and Cape Douglas south 71° west forty-seven miles.

COOK'S INLET.

This great arm of the sea lies in the extreme northwest part of the Gulf of Alaska. Its general direction is north-northeast, and its length one hundred and sixty miles. The entrance lies between Cape Elizabeth on the east and Cape Douglas on the west; the latter south 71° west forty-seven miles from the former. Broad off the entrance lies the northern part of the Kadiak group and the Barren Islands. Between the former and Alaska Peninsula lies the Petries or Shelikoff Strait, almost in the form of a prolongation of the inlet; between the northern extremity of the Kadiak group and Cape Elizabeth is the entrance to the inlet from the east. In the middle of this eastern entrance lies the Barren Island group, with a broad, deep passage on either side. From Cape Edgecumbe to the Barren Islands the distance is five hundred and forty miles, and the course west 12° north. From the Farallon of San Francisco Bay the distance is one thousand six hundred and seventy miles, and course north 42° west. On neither course is any danger known to exist.

The entrance between Cape Elizabeth and the Barren Islands is ten and a half miles wide, and named the Eastern Passage. The entrance between the Barren Islands and Point Banks to the south is thirteen miles wide, and was used by the old navigators as occasion suited. There appears no notices of strong tide in it.

The eastern passage has bold shores and a depth of ninety-five fathoms over coarse sand in mid-channel. Vancouver found seventy fathoms over sandy bottom, about five or six miles south 6° east from the eastern Chugach Island, and north 39° east from the southern tangent of the Barren Islands. The currents rush through with great velocity, and for an hour, at certain changes in the tides, occasion great rips, which Tebenkoff magnifies into something very alarming; but evidences of their exceedingly dangerous character are not found elsewhere. Portlock says that in passing from the Barren Islands for Cape Bede (northeast of Cape Elizabeth) he passed several strong ripplings of a tide current. Tebenkoff says: "The tide rips, however dangerous, do not extend across the whole entrance, but are experienced, for about an hour, in the middle. The sea suddenly rises and boils with a tremendous noise, and forms high, short, and irregular waves, which topple with all their volume over the vessel that happens to be among them; even during a strong, fair wind the lower sails flap against the mast, while the upper ones are perfectly filled; the vessel refuses to obey the helm, and the hatches must be battened down."

Within Capes Douglas and Elizabeth the inlet expands to sixty-five miles in width; in fifty-five miles from the entrance it contracts suddenly to twenty-five miles at Anchor Point, whence it gradually diminishes to twelve or fifteen, with the channel contracted by several extensive flats off the rivers emptying into it at its head. Its extreme northern point is in latitude 61° 16′, at the mouth of the Suchitna River, coming from the north and "abounding in slate."

Cook's Inlet is the great boast of the Russian navigators and authorities as the best part of Alaska, and has been favorably noticed by nearly all the old discoverers. The well-known existence of coal upon its shores and in its bays may make it a very valuable acquisition to the Pacific coast. The eastern shores are broken by several small bays and harbors near the extremity of the peninsula, and by the large arm penetrating the peninsula, and known as the Chugatchik Gulf. But two large islands lie in the inlet—Augustin, west-northwest from Cape Elizabeth, and Kalgin, east of Redoubt Mountain. The eastern shore, after passing Chugatchik Bay, is undulating, and this characteristic extends fifteen miles inland to the base of the mountains. It has a pleasant, green appearance in summer, covered with herbage and dotted with patches and clumps of timber. But the character of the soil is marshy. The same sphagnous morass covers it that we found throughout the Alexander Archipelago, Kadiak and Unalaska. Eastward of this comparatively low ground rises the mountain range that extends through the length of the Kenai Peninsula toward its eastern shores and filled with glaciers on both flanks.

The western shores have a narrow border of low wooded land at the foot of the Alaskan mountains.* Westward of Augustin Island the shores appear the margin of "an extensive low country lying before the base of these rugged mount-

*This range was described and named in the Proc. Bost. Soc. Nat. History, November 4, 1868, for the first time as a *whole*, by W. H. Dall.

ains." (Vancouver.) Northward of this island the shores are "indented and broken into coves and small bays that appear capable of affording anchorage." "The points of the entrance to these bays are in general steep and rocky, behind which rises a compact mountainous country to a considerable height, clad in perpetual snow. A narrow flat margin along the shore is tolerably well wooded." Twenty miles northwest by west from the northeast point of Augustin is a small bay opening to the southeast, with a small islet on the south side of the mouth. At the head of this bay is a factory of the Russian-American Company, from which a trail leads about seven miles through a gap in the mountains, to a series of mountain lakes discharging within a distance of fifteen miles into the great lake of Iliamna, which empties through the Kaichak river into Bristol Bay, on the northwest side of the peninsula of Alaska.

The great volcanic peaks of Iliamna and Redoubt, rising to twelve thousand and sixty-six and eleven thousand two hundred and seventy feet elevation, respectively, (see views in Tebenkoff chart,) lie in the range of compact, connected, and very high mountains binding the western shores of the inlet, but throughout these waters the shores are well wooded, and north of the Redoubt the mountains retreat well to the northwest.

Twenty-eight miles northwest of Cape Douglas is the eastern point of the high island of Augustin, about eight miles in diameter and nearly round. Between it and the shores to the south-southwest, sixteen miles distant, lies the bay of Kamischak, with soundings from seven to thirteen fathoms on a line directly across it from north and south, and passing tangent to the west side of the island.

BARREN ISLANDS.

Nearly mid-way between Cape Elizabeth on the northeast and Point Banks on the southwest lie the Barren Islands in two principal groups, the extreme eastern and western points of both being thirteen miles apart, in a general east by north and west by south direction, and bounded by latitudes 58° 53′ and 58° 59′, and longitude 151° 53′ and 152° 19′, with a channel three miles wide between the groups, and supposed by Portlock to have great depth of water. This channel lies north and south, and Cook when approaching them from the southward intended to pass through this channel, but meeting a strong ebb current went to the eastward of them, and found eleven, twenty-four, and thirty-six fathoms near them.

Tebenkoff says "the eastern group has three islands and the western four, all of them rather elevated, steep, rocky, and perfectly barren."

The largest of them is Uschugat* Island, situated in the west group. It is six miles in length and lies southwest by west and northeast by east, with an average width of one and a half mile; the southwest point is situated in latitude 58° 40′, longitude 152° 19′.7, according to Benzeman. Two small islands lie half a

*The Russian charts differ much about the spelling of these Indian names.

mile to the westward of the west point; they are not laid down on Tebenkoff's chart, but a pyramid rock is laid down south of the west point.

A large island lies half a mile north of the northeast end of the island, and another lies three miles southwest from the southeast end of the island. Along the northwest shores of Uschugat a peninsula makes out, connected by a narrow neck with the main shore.

The largest island of the eastern group is Amatuli, (Matuli on one chart,) one and a half mile in length, with its east point in latitude 58° 57′.6, and 151° 53′ longitude, according to Benzeman. Two other smaller islands are situated one to the northwest and the other to the southwest and very near each other. One mile south from Amatuli Island is a high pyramidal rock. On the east side of these islands the uniform depth of bottom is forty, fifty and sixty fathoms, fine sand and gravel.

Kruzenstern considered this group of islands as the northern part of the Kadiak Archipelago.

The islands are very high and totally barren. Cook, who gave their latitude very closely, applied the name to them from their appearance. Dixon speaks of one of them as the "Sugarloaf" Island. No navigator ascribes any height to them, but Vancouver saw them from latitude 58° 10′, longitude 151° 28′, a distance of fifty-two miles. They doubtless rise two thousand feet above the sea. Portlock reported the vicinity full of whales in vast numbers.

From the east point of Amatuli Island Cape Cleare bears north 67° east, one hundred and twenty-seven miles; Cape Elizabeth north half east, twelve miles; Point Banks south 36° west, twenty-two miles; Cape Hermogenes south 4° east, forty-four miles. The eastern part of the great Portlock Bank, where we found eighty fathoms, lies south 70° east, one hundred and six miles from Amatuli.

Tebenkoff and other Russian authorities call these islands the Bezplodni or Peregrebni, (Paddle-over.)

POINT BANKS.

This is the northernmost point of the Kadiak Group, forming the eastern shores of Petries or Shelikof Strait, and the southwestern point of the eastern passage to Cook's Inlet.

It lies south 65° east, thirty-two miles from Cape Douglas; south 29° west, thirty-one miles from Cape Elizabeth; twenty-two miles south 36° west from the eastern point of the Barren Islands, and north 33° west, thirty miles from Cape Hermogenes.

The point is in reality formed by the small island Perevalenoi or Passage Island, but the passage between it and the Tschuyak Island to the south is very narrow and cannot be made out at a distance.

Cook was about fourteen miles east half north from it when he says, "the land extends from south half west to nearly west, and in the latter direction it ended in a low point which was named Point Banks." No other navigator has described it.

Cook placed it on his map in latitude 58° 42′, longitude 152° 48′. Benzeman places the north end of the island in 58° 39′ and 152° 19′. About latitude 58° 30′, longitude 151° 35′, Portlock got soundings in 45 fathoms; this is twenty-five miles south 68° east from Point Banks; in latitude 58° 25′, longitude 151° 22′, he got forty fathoms over gravel and dark sand, thirty-two miles south 64° east from Point Banks, and the same depth extended thirteen miles further to the southeastward. In 58° 26′, 151° 57′, Cook got soundings in forty fathoms over a bottom of sand and shells, seventeen miles south 41° east from Point Banks, and caught halibut while his vessel was becalmed.

CAPE DOUGLAS.

The formation of this cape is sand and rock, and is a low sandy point stretching westward five miles into the sea from the base of very lofty mountains wrapped in snow, which, as late as May, covers the surface of the low margin of shore to the water's edge. (Vancouver.) Tebenkoff gives a view of the cape, wherein it appears moderately low and rocky, and without wood, but no signs of its being sandy.

No elevation is given by any of the old navigators, only the Russians, but Vancouver incidentally mentions that from the southern extremity of Kalgin Island, in latitude 60° 23½′, he observed the bearing of the mountains seen over Cape Douglas, distant thirty-five leagues. If this was the "Fourpeaked Mountain" fourteen miles southwest from Cape Douglas and seven miles inside the nearest shore, the distance at which it was visible was one hundred and ten miles. Cook saw this mountain eighty miles distant, from latitude 58° 10′, longitude 151° 28′, over the northern part of the Kadiak group. He says: "We got sight of a very lofty promontory whose elevated summit, forming two exceedingly high mountains, was seen above the clouds. This promontory I named Cape Douglas; it is situated in latitude 58° 56′, ten leagues west of the Barren Islands."

This mountain, immediately behind Cape Douglas, must be over eight thousand feet above the sea, from the foregoing facts.

The south side of Cape Douglas has soundings laid down in six, eight, nine, and eleven fathoms, with two reefs of rocks, respectively lying seven and eleven miles to the south and the south-southwest, with passages between them and the shore, off which they lie about three and one miles, respectively. On the north shore, three miles from the point of the cape, is Dry Bay, an indentation with a broad shoal just inside its heads, which are one mile apart. Seven or eight miles north 39° west from the cape lies a very low, flat island, four or five miles long, in a north and south direction, and about a mile wide; off its north end Tebenkoff lays down sunken rocks for a mile and called it Kamishak. Vancouver named it Shaw's Island. The geographical position of Cape Douglas is latitude 58° 53′, and longitude 153° 16′; Vancouver placed it in latitude 59° 52′; from it Cape Elizabeth bears north 71° east, distant forty-seven miles; the western point of the Barren Islands, east thirty miles; and Point Banks south 65° east, thirty-two miles;

and the eastern side of the Island of Augustin north 9° west, distant twenty-eight miles.

The detailed description of Cook's Inlet will be made of the eastern shore first, beginning at the southward.

PORT CHATHAM.

This is the first harbor inside Cook's Inlet on the western shores of the Kenai Peninsula, and the southern point of its approaches may be said to be formed by Cape Elizabeth; it opens to the southwest. Vancouver gives a plan of it which has been copied by Tebenkoff.

From that cape, marked by a small islet off it, the southwest point of the inner entrance to the harbor bears north 45° east, distant five and a half miles, and a half mile before reaching that point there is a rocky patch marked by an islet. Inside the entrance the harbor extends about three miles east, and has an average width of one mile. The passage into it, after leaving Cape Elizabeth, is free from all obstructions but such as are sufficiently conspicuous or easily avoided. These consist principally of shoals that extend a little distance from each point of the harbor. Even between the islet and rocky patch southwest from the south point of the entrance a passage exists that has from seven to twelve fathoms of water.

The soundings in general in Port Chatham are tolerably regular from five to twenty-five fathoms; the bottom a stiff clay. The shores are in most places a low border, very well wooded with spruce and some shrubs. This border forms a narrow margin between the shore and the foot of the mountain, up which to a certain height trees and plants grow; but the tops of the mountains are covered with snow. (May 1794.) The anchorage on the south shore is one and a half mile inside the point in latitude 59° 14′, longitude 151° 42′.* The rise and fall of the tides near the changes of the moon is fourteen feet, and neaps about eleven feet, but they are greatly influenced by the force and direction of the winds.

Vancouver considers this harbor, with reference to its proximity to the ocean, ease of access, egress, and convenient communication with the shores, superior to any in these regions. But he never examined Chugatchik Bay, where the currents are not so uncertain and variable, where the bay is four or five miles wide, and especially where bright clear weather exists while the whole of the Cape Elizabeth region is in fog and drizzle. Russian and American captains give the preference to the northern bays.

Three miles northeast by north from Cape Elizabeth, under the north point of the approaches to Port Chatham, is a small indentation of the low shore in the eastern part of the point, open to the southeast, and three and a half miles northeast by north from Cape Elizabeth. The entrance is narrow, and two rocky shoals extend a quarter of a mile off each point towards the southeast. The cove itself is about a mile deep, and Tebenkoff places soundings of five and six fathoms at the

* Archimandritoff places Port Chatham in latitude 59° 13′.5, longitude 151° 42′.5, but does not specify the locality.

entrance. Portlock's longboat anchored here in 1786, and notes five, four and seven fathoms of water over a muddy bottom. The extreme western part of the cove is a flat, and a small stream enters the northern part. It is named *Refuge Cove.* Puget anchored here in the Chatham, when searching for a harbor, in thick fog with strong westerly winds. He says that when at the entrance "they felt the influence of a very strong flood tide from the eastward, through the channel between the Chugach Islands and the peninsula, and the conflict of currents therefrom appeared like breakers, extending nearly half-way across the entrance into the cove; and although the depth was not less than fourteen fathoms, yet so violent was the agitation that the cabin windows were obliged to be secured by the dead-lights. The appearance of the cove was favorable, and the vessel worked in and anchored in five fathoms, sandy bottom. The southwest point of the cove, in a line with Cape Elizabeth, bore south 5° west by compass; the passage between the Chugach and the peninsula south 48° east; the bottom of the cove north 67° west, and the nearest shore south 57° west, a quarter of a mile distant." The current rips did not continue, for although the weather grew worse, a boat was able to go out and search for a better location.

Portlock notices a cove three miles northward of the north point of the approaches to Port Chatham, and Tebenkoff represents it a mile in extent, open to the southwest. Portlock's boat anchored in the southern part of it in two fathoms, muddy bottom.

POINT BEDE.

Eleven miles north 27° west from Cape Elizabeth is the long rounding "lofty promontory, named Cape Bede" by Cook. Tebenkoff on the chart represents the immediate point as low and wooded, with the mountains rising high about three miles to the eastward. No elevation is given of the height of the mountains in this vicinity, but Puget made bearings upon it at a distance of sixty-three miles. Along the immediate shore of the point are laid down a few rocks. Thirty fathoms are given four miles west of the point. Archimandritoff places Point Bede in latitude 59° 19′.5, longitude 151° 58′.6. Off this point the ebb current sets from the north, by compass, at the rate of two knots per hour; the flood sets from the south, and runs nearly at the same rate; the rise and fall of the tide is reported at fourteen feet.

For five miles beyond Point Bede the shore runs about northeast by east to the south point of the Graham Harbor of Portlock, (the English harbor of the Russians.)

GRAHAM OR ENGLISH HARBOR.*

Five miles northeast by east from Point Bede lies the southwest point of the entrance to this harbor, which opens to the westward. The following description is drawn up from a manuscript sketch of the harbor by officers of the Russian-

*Named Graham Harbor by Portlock in 1786; known by the Russians as English Harbor.

American Company. In it are laid down rocks that have been recently discovered.

The entrance to the harbor is formed by Dangerous Cape (Cape Opasnoi) on the north, and Russian Point on the south, the former lying north 18° east, two and a quarter miles from the Alexander trading post on the latter. A rocky reef extends one mile northwest from Dangerous Cape, and detached rocks with intervening deep passages stretch out three-quarters of a mile southwest from the same cape. Tebenkoff has a detached rock high above water, just west of the rocky reef off Dangerous Cape.

From Russian Point an extensive shoal makes broad off the shores of the above beach for one mile, with part of it, just under the point, bare at half tide.

The general direction of the bay is south 62° east for four and a half miles; then south-southeast for two miles, ending, however, in very extensive mud flats, receiving several small streams, which Portlock entered with his boat at high water.

One mile within the entrance, and nearly in the middle of the bay, lies Passage Island, about half a mile long in the direction of the bay, and a quarter of a mile broad. Abreast of the inner part of this island the harbor contracts to one mile in width, maintaining that width for the next three miles.

From the southwestern point of Passage Island a long reef extends over a mile west-southwest, nearly across the south channel to Russian Point, off which a very narrow passage exists, which Portlock says he examined and found plenty of water.

The passage on the north side of the island is the better one, with rocks off each point for a couple of hundred yards, but leaving a channel of five hundred yards wide, with seventeen fathoms of water over a muddy bottom.

Portlock examined the south passage and found plenty of water, but it is much narrower than the northern one. The Russian chart places it only two cable's length north of Russian Point, and only one cable wide at the narrowest point.

In entering this bay by the north channel Portlock says he found a "strong outset current, although the tide was flood," and upon leaving it "with the flood tide was carried out very rapidly by currents to the northward past Dangerous Cape." He says the best time for entering this harbor is near low water, as the rocks then show themselves, or the kelp discloses their position.

Three-quarters of a mile inside the point northeast of the east end of Passage Island a number of sunken rocks stretch southwest about half-way across the harbor. The Russian sketch exhibits one rock in this ledge above water, and three and five fathoms over the rest. It will be well to pass a quarter of a mile east of Passage Island to clear a sand tongue making out from it, and then haul southward for the southern shore towards a house on the beach.

Safe anchorage may be had anywhere in the harbor, and towards the head in ten fathoms water, where the bottom is muddy.

Close under Dangerous Cape is *Coal Bay*, a small anchorage of less than half a mile in extent, with soundings from twelve to five fathoms over fine black sand. To enter this cove and clear the reef off the cape, run for Passage Island until the cape bears north by east half east about one mile distant, and steer north 30° east towards the middle of the cove. It will not be safe to bring the cape anything to the north of the first course, as a rock with one and a half fathoms at low water lies north 50° west one mile from the north point of Passage Island. A village is located on the small stream in the southeast part of the cove. This harbor is the one where coal was first discovered on this coast by Portlock, and the anchorage close under the north point was named Coal Bay by him. He gives a sketch of the harbor and a view exhibiting the locality of the coal seams.

A second cove, twice as large as Coal Bay, lies one mile south-southeast from the latter, with good anchorages in ten to fifteen fathoms of water. The northern shores of this cove, which is about three-quarters of a mile wide, are bold and rocky, and guarded by rocks, but at the head of it there is a fine smooth beach, near which is a run of good water. Another opening, close under the point at the south, is the entrance to a salt-water lagoon or lake, called Selenic Lake. Here Portlock reports wood of different kinds in great abundance, such as pine, (spruce,) black birch, witch hazel, and poplar. Many of the pines are large enough for lower masts of vessels of four hundred tons, and in every place were plants and shrubs of many varieties growing with great strength and vigor.

The latitude of the village in Cove Bay is given by Archimandritoff as 59° 24′, and the longitude 151° 49′ 18″, the latter depending upon the United States Coast Survey determination of Sitka. At the Alexander trading post the latitude is 59° 21′ 50″, longitude 151° 52′. The variation of the compass is stated to have been 300 east in 1848.

No data are given for the time of high water and the rise and fall of tides, which may be assumed to be nearly those of Port Chalmers.

There is a Russian station and an Aleutian village on Russian Point, and a "pleasant piece of land about two hundred yards wide stretches southward and westward of this point for one mile, bordered by a good sandy beach on one side, and on the inside by a small lake of fresh water, which empties itself into the sea" three-quarters of a mile from the station. This lake or lagoon is one of a chain of lakes reaching well inland. This "beach terminates at each end in high points of land, which form a snug bay where small craft might lie with safety."

Portlock says he "found Chatham Harbor a most excellent one indeed, with great plenty of wood everywhere and several fine runs of water. The eastern side affords great abundance of pine, black birch, witch hazel, and poplar, which grow close to the beach; plants and shrubs of various sorts were growing with great strength and vigor. (June 21 1786.)

"The harbor terminates in a fresh-water river that branches out in several directions; they were filled with salmon, which the bears came down to feed upon. Bears were plenty; he saw over twenty in an hour.

"There are several projecting points on each side of the harbor that form very snug and good bays, with excellent beaches, where a ship may be laid on with the greatest safety; the depth of water close to the beach being seven and eight fathoms."

From the entrance to Graham Harbor the direction to Anchor Point is north, and the distance twenty-seven miles, forming the broad gulf to the mouth of Chugachik Bay. The general direction of the coast line from Graham Harbor to the head of this bay is north 50° east, and distance thirty-nine miles, this course being very nearly that of the south shore of the gulf and bay.

Six and a half miles northeast by east of Dangerous Cape is the opening to the north of a small bay with shallow water, but anchorage is had close under the western point in four or five fathoms. According to Tebenkoff's chart, there is six fathoms in the entrance of the bay, which is about three miles long, north and south, and two-thirds of a mile wide. Rocks are laid down on the manuscript chart close to each point, which are represented as bold and rocky. On Tebenkoff the points lie east and west of each other, but on the manuscript chart they lie northeast and southwest of each other. It is the Selidevoi of the Russian charts.

Three miles east-northeast of the eastern point of the latter bay is a bold, rocky point, forming the southwestern point of the entrance to a broad bay full of islands, with a long arm penetrating some miles to the southeast, but unexplored. Twenty-five fathoms are noted in the entrance, and anchorages designated close under the western point. It is named Lutke Bay by Tebenkoff.

CHUGACHIK BAY.*

Twenty-eight miles north 43° east from Point Bede, twenty-two miles north 46° east from Dangerous Cape,† and twenty miles south 56° east from Anchor Point,† lies the north point of the entrance to the inner Chugachik Bay.

The north point of the entrance to the bay, named Coal Point, is low, three miles long, and over half a mile wide, stretching from the north shore half-way across the entrance in a southeast half east direction. In approaching this point the manuscript chart locates two sunken rocks that are almost in the middle of the approaches to the bay. The first one bears south 66° west, five and a half miles from the extremity of Coal Point, and the second south 59° west, distant two and three-quarter miles from the same. Tebenkoff does not give them on his chart. Close off the point ten and fifteen fathoms are given, and twenty-seven in the middle of the entrance.

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*On some Russian charts Kotchekmak Bay; in Tebenkoff's narrative Chugachik, or Katchetmak Bay.

†These are the distances and positions by Tebenkoff; but a manuscript chart of the Russian-American Company makes the distance and direction from Dangerous nineteen and a half miles north 54° east; and from Anchor Point twenty-one miles south 50° east. There would appear to be an error of meridian line. On the manuscript chart the bearings between Russian and Anchor Points are the same, but the distances, thirty miles on Tebenkoff, and twenty-seven in manuscript; the details look more natural in the manuscript, and will be followed in the description.

From this point the bay has a general direction north 47° east for nineteen miles to the head, but the last four miles are occupied by a broad flat, with an islet in it, although Tebenkoff gives four fathoms around this islet, with two pinacle rocks on its northern side. This flat carries a broad margin along the whole northwestern shore, even to Coal Point. (Ugolinoi.)

Along the inside of this tongue or point the beach or flat extends nearly halfway to the extremity, contracting the bight where good anchorage is had in seven fathoms, mud, one mile inside the point, where it bears south, one mile distant, and nearly the same distance from the beach, but still leaving it about one and three-quarters of a mile in extent, with seven fathoms of water. Upon this tongue, abreast of the broad beach or flat, is a long, narrow lagoon. Outside of the point, to the northward, is a broad beach for some miles to the northwest. Inside this tongue of land, and abreast the anchorage, there is found an extensive coal seam, seven feet thick, and not worked by the Russian-American Company, because it opens upon the beach at low tide, and will require outlay of capital to develop and work it. This, or similar seams, crops out on the shore between the bay and Anchor Point in two places for an extent of several miles; and again northward of Anchor Point.

From Coal Point three miles south 75° east there is an islet joined to the southern shore by a low sand tongue; this decreases the actual width of the entrance of the bay. East of that islet are two or three coves, but no soundings are given for them, except at the entrance of the second, where twenty-seven fathoms is laid down in the approaches.

The geographical position of the extremity of Coal Point is latitude 59° 37′ 10″, and longitude 151° 22′ 10″, according to a recent Russian manuscript chart. Tebenkoff states the position to have been determined by Archimandritoff, who found the latitude 59° 39′.9, longitude 151° 20′.3.

From Coal Point the coast runs nearly straight for twenty-one miles north 50° west to Anchor Point, in latitude 59° 51′, longitude 151° 53′.

The climate of this bay is much preferable to that at Graham harbor. Russian and American navigators report that they have anchored here and had clear, beautiful weather, while they could see the thick, heavy masses of fog and rain clouds along the mouth of the inlet in the vicinity of Cape Elizabeth. In winter it is, however, very cold, and in excessively cold winters the whole inlet freezes nearly or quite as far south as Anchor Point.

ANCHOR POINT.

The position of Anchor Point was determined by Chernoff and others in latitude 59° 50′.9, longitude 151° 52′.8, and is so used by Tebenkoff. Cook placed it in 59° 51′.

It lies north 5° east, thirty-two miles from Point Bede, in the general direction of the east shore of Cook's Inlet to the East Foreland. Between it and Point Bede

lies the Chugachik Gulf, stretching forty miles to the northeast. The country behind it is low and undulating and covered with wood for twenty miles, to the foot of the mountains, forming the backbone of the Kenai Peninsula.

The shore, towards Coal Point, of Chugachik Bay stretches south 50° east for twenty-two miles, and towards the head of the inlet it runs north 21° east forty-six miles to the mouth of the Kaknu. Five miles towards Coal Point Tebenkoff lays down the entrance of a small stream. From the point the cone of the active volcano Iliamna lies north 72° west, forty miles distant, and volcano Redoubt north 31° west, forty-five miles.

The inlet at this point is twenty-five miles across, with a strong current on the ebb and flood; Cook says he found three or four knots an hour, on ebb, setting southward. He was then at anchor off the point in twenty-one fathoms, having let go an anchor to save the vessel from drifting out. Tebenkoff gives twenty-two fathoms, sandy bottom, four or five miles to the westward, and eight or nine miles south 70° west from the point are irregular soundings from thirteen to twenty fathoms.

Portlock says: Anchor Point, bearing north 33° east five miles, had twenty fathoms rocky bottom; he anchored in mid-channel with Anchor Point bearing south 30° east, and had thirty fathoms, with a current running four knots per hour, ebb setting from north by east and flood from south by west, and at half tide it ran nearly five knots an hour. Cook named the point from the circumstance of losing an anchor in twenty-one fathoms, mud, nine miles west of it.

On the coast eight miles northward of Anchor Point, in latitude 59° 58′, Tebenkoff has a stream called the River Staritchkoff. Grewingk places this under a cape called Staritchkoff, with a hill marking its position. The stream runs northward for three or four miles close to and parallel to the shore and opening out under this cape. Grewingk calls the stream Stak-Tali-Chin and the cape Stak-Tali-Chak.*

Thence the shore is a little higher for ten miles to Cape Ninilochik or Sanif (Grewingk) with a stream emptying just north of it. Tebenkoff has two streams and two mouths. Grewingk says two streams emptying by one mouth; the southern one the Chaik Chak, the northern one with a village on the Munima.

Twenty-eight miles from Anchor Point, in latitude 60° 16′, a shoal makes out from the coast line about two miles, it is Ninilochik Shoal and is the southern part of the great shoal lying north of the Kaknu River, according to Tebenkoff. Over this shoal, in latitude 60° 24′, empties the river Kasilof on the north side of a cape of the same name. This river is continued but a short distance inland by Tebenkoff, but Grewingk gives its course a little south of east to the lake at the base of the Kenai Mountains. This body of water is quite large and is called the Tustumena Lake. Upon it open from the eastward two large glaciers, and the overlooking mountains are covered with perpetual snow. The natives are said to use the

* Grewingk cannot be relied upon; his information was from second and third hands in all cases.—DALL.

stream to reach the head of Resurrection Bay, on the eastern shores of the Kenai Peninsula.

The cape on the south side of this stream is Kasilof. Abreast of this shoal lies the island and shoal of Kalgin, only nine miles west, with a channel between the shore and the island, having from six to fifteen fathoms and lying nearly north and south.

KAKNU RIVER.

On the east shore of Cook's Inlet the mouth of the Kaknu opens in latitude 60° 32′.2, longitude 151° 19′.3; the entrance is about one-quarter of a mile wide, and the depth of water inside ten and twelve feet. Off shore the river passes through an immense flat with a channel having but five feet of water at low tides. Range marks are established on the north side of the river, east of the Redoubt, but it will not be safe to use them, as no later published directions than those of Tebenkoff in 1847 are found. The south side or left bank of the river has low shores, but the shore to the north is a bluff that extends into the river. Anchorage is had abreast of the beacons off the first break in the bluff, in ten feet of water, mud bottom. The "usual rise and fall of the tide is twenty feet." The magnetic variation was 29° east at the Redoubt in 1848.

This stream runs a little north of east, and heads in the Skillokh Lake, so far unexplored.

There is a native village on the north side or right bank of the stream, and a trading post of the Russian-American Company, called the Redoubt Nicolas. We know nothing of the population of the place. In winter natives are said to cross the Kenai Peninsula from this post.

The geographical position was determined by Helt.

ST. CHRYSOSTOM HARBOR.

About two or three miles north of the mouth of the Kaknu is the southwest point of a bay open to the westward, that extends a mile and a half deep to the eastward. It has no soundings laid down in it, and is called Zlatousta Harbor, in Russian. It is protected from all winds except from northwest to southwest, and it might be a safe resort when a vessel met with the driving ice of the ebb current. It was formerly the usual winter anchorage of the Russian vessels. On Tebenkoff the southwest point of the harbor is in 60° 34′, longitude 151° 22′. We can find no sketch of it.

EAST FORELAND.

Eleven miles north of the Kaknu the inlet contracts to a width of nine miles between the East and West Forelands, which lie almost exactly east and west of each other; soundings of twelve fathoms are laid down within a couple of miles of either shore, but none in mid-channel. Portlock says that crossing the inlet from the anchorage in Trading Bay, north of the West Foreland, he found no

bottom in mid-channel at sixty fathoms. Vancouver says the shores of the inlet are comparatively low, or only moderately elevated, and jutting out into three remarkable steep cliffy points, which he named East, West, and North Foreland. Off the north face of the eastern Tebenkoff lays down some rocks. From the southwest point of St. Chrysostom Bay, the East Foreland bears north 17° west, ten miles, and the north end of Kalgin Island south 87° west sixteen or seventeen miles. Vancouver gives the latitude 60° 43′, longitude 150° 41′. Malakoff, about 1834, observed the latitude 60° 43′, and longitude 151° 27′.3, and this is used by Tebenkoff.

The country behind the East Foreland is represented as low for twelve or fifteen miles to the foot of the mountains. Grewingk calls this Cape Mikischkin, or Tucan Tan; Portlock calls it the South Foreland. From this cape the general direction of the shore, as well as the inlet, is north 55° east for thirty-six miles to Point Possession, but nearly the whole of this shore is bounded by an immense rocky shoal.

Three miles east-northeast from the extremity of the East Foreland is the southwest point of a broad, shallow bay, opening towards the southeast, and bounded on the northeast by the southwestern end of the shoal stretching hence to Point Possession. "It has soundings of seven and eight fathoms within a convenient distance from the shore, sheltered from the northeast and southwest winds, and not much exposed to those which blow from opposite quarters." Into this shallow bay Grewingk has a small stream running from Lake Salamantova or the Kutsch-tazik-Mitscha*. The southwest point of the shoal lies northeast seven miles from the East Foreland. The shoal coast hence to Point Possession is thus described by Vancouver: "The whole space was incumbered by an immense number of conical rocks, detached from each other, in a bank of sand and small stones, that extended a league and upwards from shore. These rocks are of different elevations, and as few of them are of sufficient height to appear above the surface at high water, the navigating of this shore, with such rapid tides, requires to be undertaken with the greatest caution.

"The utmost circumspection was required to conduct the boats clear of the dangerous pyramidal rocks, rising perpendicularly from a base at a depth of four to nine fathoms, and perfectly steep on every side within the distance of a boat's length."

The western part of this shoal is supposed to extend northwest about six or eight miles to the middle of the channel to the north shore; although it is probable that a channel exists through the shoal, none has been traced out.

POINT POSSESSION.

This is a low point, well wooded, near the head of the inlet, where it terminates in two branches. There is deep water close to the point. Turnagain Arm, or River, stretches nearly east-southeast for thirty-six miles, of which distance

* See previous note on Grewingk.—DALL.

the further half is occupied by flats, bare at low water, but having from four to five fathoms at high water. Two miles northeast of the point is the southwest extremity of a great shoal coming from Cape Campbell, lying seven and a half miles north 77° west from the point, and forming the northwest point of the entrance to Turnagain Arm, and the southeast extremity of the point of entrance to the River Knike.

The mouths of the Suschitna River lie about fourteen miles to the north-northwest, while the North Foreland is twenty miles due west.

TIDES OFF POINT POSSESSION.

Tebenkoff gives twenty-seven feet rise and fall of tide; the currents run four to five knots, and in spring, when the ice breaks away, it is dangerous navigation for any vessel.

Cook took "possession" of the country at this point, and hence gave it the name; he deposited a bottle, &c., which Vancouver searched for in vain.

Cook's map places the point in latitude 61° 05′; it is in 61° 03′, (longitude 149° 42′,) according to Vancouver.

Malakoff gives it 61° 03′.5, longitude 150° 25′.5, which is the position on Tebenkoff, who calls it Cape Naselenia, (settlement.)

TURNAGAIN ARM.

This is the Turnagain River of Cook, and stretches from Point Possession thirty-six miles east-southeast; at high water it has a width of eight to ten miles for about eighteen miles to a sudden contraction of two or three miles width, thence it has an average width of four miles, but is bare at low water. The main channel runs in nearly a straight line from Point Possession to the southern point at the throat of the arm, with an average depth of six or seven fathoms.

The shores of this wide part of Turnagain Arm form a bay on each side at high water, but they could not be approached on account of the shallow flat that extends from the land on the northern side for three to five miles, and on the southern side about half that distance; between which is a channel about four or five miles wide, which is, however, contracted and obstructed by a shoal that is in many places dry, and situated about eight miles east-southeast from Point Possession. It lies lengthwise across the channel northeast and southwest for four or five miles, and one or two wide, leaving a channel between its south point and the flat off the south shore of about one and a half mile. In this part of Turnagain Arm close under the south shore, thirteen miles east-southeast from Point Possession, is a small inlet where Vancouver rested to obtain its position, latitude 60° 57′, longitude 149° 17′. Tebenkoff gives the longitude 150° 02′.

From Point Possession eastward to the throat the "country bordering upon the bays is low, well wooded, and rises with a gradual ascent until at the inner point (throat) where the shores suddenly rise to lofty eminences in nearly perpendicular cliffs, and compose stupendous mountains, that are broken into chasms

and deep gullies. Down these rushed immense torrents of water, rendering the naked sides of these precipices awfully grand; on their tops grew a few stunted pine trees, but they were nearly destitute of every other vegetable production. The tide at this situation rose thirty feet perpendicularly, so that at low water the arm must be dry or nearly so." (Vancouver May 1794.)

At the throat or inner points Vancouver says the northeast point lies north 42° east, three and three-quarters miles from the southwest point.

The arm seems finally to terminate in latitude 60° 54′, longitude 148° 30′, in a circular manner, surrounded by high, steep, barren mountains covered with perpetual snow. Tebenkoff gives the termination in latitude 60° 53′, longitude 149° 13′.

Through this arm Vancouver understood the natives made their winter connection with Prince William Sound, passing over a hill or mountain for ten or eleven miles, when they descended into an arm of Prince William Sound. Tebenkoff says they now make it from the Kaknu.

*KNIK RIVER, OR FIRE RIVER.

This river was entered by Cook and Vancouver. The former examined it to latitude 61° 30′, and the latter to latitude 61° 29′. It is not navigable more than twelve miles from its mouth, when it expands to a width of six miles. Point Woronzo, (so named by Vancouver, May 1794,) forming the southwest point of the river, is in latitude 61° 08′, longitude 149° 24′ by Vancouver, 150° 07′ of Tebenkoff.

Point Mackenzie is the northeast point, so called by Vancouver, and bears about northeast from Woronzo, distant two miles, with twenty to thirty-three fathoms of water between them. Thence the general direction of the river to its contraction is northeast to latitude 61° 28′, longitude 149° 32′. His position was in latitude 61° 17′, longitude 149° 58′, (Tebenkoff;) rise and fall of spring tides about twenty-seven feet, and high water 6*h*. after moon had passed the meridian. The magnetic variation was 29° 30′ in May 1794. The river has a general direction to the northward, and Tebenkoff says the traders, following the Knik, reach Lake Plavejno, (latitude 62° 10′, longitude 149°,) and thence, ascending the Tlischytue River, arrive at Copper River. Grewingk has a post, Nüchta, at the contraction of the Knik, to where Vancouver explored. Vancouver anchored in the lower part of the river, where he got seven fathoms, and was in great danger from driving ice. From Point Woronzo the shore to Point Campbell (named by Vancouver) runs south 19° west for four miles. Cook says much low, flat land borders the inlet from the east point of the river to the northwest, and that a great quantity of fresh water flowed into the inlet. He gives the rise and fall of the tide twenty feet.

Vancouver says of the country bordering the river to the limit of his exploration: "The shores we passed were compact. Two or three small streams of fresh water flowed into the branch between low, steep banks; above these the surface

* Pronounced kneek, from the Esquimaux name for fire.

was nearly flat, and found a sort of plain on which there was no snow, and but very few trees. This plain stretched to the foot of a connected body of mountains, which, excepting between the west and northwest, were not very remote; and even in that quarter the country might be considered as moderately elevated, bounded by distant stupendous mountains covered with snow, and apparently detached from each other." (May 1794.)

TURNAGAIN ISLAND.

Six miles off the mouth of the Knik River lies the east end of this island, directly in the channel: its southern shore on the edge of the flat stretching from Point Campbell, and its northern edge within a mile or two of the southern edge of the flat from the northern shore of the inlet. The channel has very variable bottom, from three to twelve fathoms. The island is three and a half miles long in an east-northeast and west-southwest direction, and about one and a half mile broad. Near its western point a shoal stretches about half a league in a northwest direction from the western point of the island, where the latitude was observed by Vancouver as 61° 08′. In consequence of this spit and the shoals which project five miles from the north shore towards the island the navigable channel is reduced to scarcely a mile in width. The deepest water, which does not exceed six to seven fathoms at half tide, is nearest the northern side. From this shoal toward the southwest the depth soon increases to twelve fathoms.

RIVER SUSCHITNA.

The several mouths of this river open upon the northernmost shores of Cook's Inlet, in latitude 61° 16′, and between longitudes 150° 30′ and 150° 39′, according to Malakoff. It has a shoal broad off its mouth, and no navigable channel is laid down through this shoal, although it is doubtless accessible at high water, and probably at low tides. The eastern point lies north by west twelve miles from Point Possession, and northeast by east twenty-one miles from the North Foreland. On either side the country is low and flat, and covered with wood. Between it and the Knik there is a range of high mountains, and at the western side a high mountain, seen by Vancouver from his anchorage west of the south end of Kalgin Island at a distance of seventy miles. This would make them over 3,200 feet elevation. Tebenkoff says this river was explored in 1834 by Mate Malakoff. North of 62° Grewingk makes it run to the northeast through a series of lakes, ending in latitude 64°, and 145° longitude. This would bring it within one hundred miles of the Kwichpak*, near Fort Youkon.

Vancouver supposed from the appearance of the land that an opening, which might prove extensive, existed a few leagues to the northeast of the North Foreland. This indicates that the break of the shore-line by the different mouths has marked characteristics.

*Now known to be the Youkon

KAMISCHAK BAY.

Returning now to the south part of Cook's Inlet, the western shore is described in detail. Kamischak is the name given by the Russians to the water bounded by Cape Douglas, Kamischak, or Shaw's Island, to the southward; Augustin Island on the north. From the north end of Kamischak Island to the south end of Augustin Island the distance is fourteen miles, and the bearings magnetic north. West of this line the bay retreats twenty-one miles to the west. Two openings exist on the shores of the bay; the first, a broad, shallow bay eight miles west of Kamischak island, with wooded, low ground at the head, and receiving the stream called Tschuiow. Rocky islets are laid down on the east and west sides of this bay. Seventeen miles west by north from the island is an unexplored opening, with bluff point on the east side and low ground on the west. The west side of the bay is indented by small coves and bays, and receives several streams.

The points of these bays are in general steep and rocky, behind which rise a compact and mountainous country to a considerable height, being a continuation of the range extending from Cape Douglas, clad in snow (April 1794,) and seemingly destitute of any vegetable productions, except a narrow, flat margin, commencing at the foot of those mountains and forming the sea shore, which was tolerably well wooded.

Between the western side of Augustin Island and the northern part of the bay there is a channel five miles wide, through which soundings may be had in five fathoms close to the island, and deeper water—ten fathoms—is indicated near midchannel. From the northern end of Kamischak Island to the islet off Tschuiou Bay the soundings are twenty, thirteen, and ten fathoms; thence to the western side of Augustin Island they decrease gradually to five fathoms.

APPENDIX No. 1.

OBSERVATIONS ON THE GEOLOGY OF ALASKA.

The coast of northwest America, from the Straits of Fuca to the Arctic Ocean, presents contrasts, in its geological as well as its hydrographical aspects, which are probably, in the same extent of territory, elsewhere unequalled in the world. The researches of the hydrographer and the geologist develop a noteworthy parallelism between the character of the various formations and the general hydrographic characteristics of the coast.

The mariner, however unobservant, while threading his way through the wonderful labyrinth of channels, inlets, straits bays and harbors which characterize the archipelago Alexander, can hardly fail to note their counterparts in the deep gorges, precipitous cliffs, and lofty mountains which lie on either side of him, due to the forces of upheaval, volcanic action, or glacial erosion. It would be equally difficult to overlook the immense alluvial deposits in the valley of the Lower Youkon and its delta, while plying the lead on the shallows northeast of Cape Romanzoff, or in Norton Sound; while the miniature icebergs of Icy Bay and Strait, often so covered with earth and stones as to simulate rocks or shoals, bring the operations of the forces of the glacial period with equal distinctness before his eyes.

The forces now most evidently at work in the Territory of Alaska are those of upheaval, or gradual elevation; plutonic, or volcanic action; and erosion, with subsequent transportation and deposition of the eroded material.

ELEVATION.

There can be but little doubt that the whole of the peninsular portion of Alaska, west of the 150th degree of longitude, is undergoing gradual elevation. This is accelerated occasionally by volcanic action in localities of limited extent. A single instance is known in Chalmers Bay, Prince William Sound, of subsidence of a low point* formerly covered with trees, whose stumps are now far below the lowest tide level. But this, in the absence of further information, must be regarded as a merely local phenomenon.

The facts in support of the above hypothesis are many. On the neck of land between Norton Bay and Kotzebue Sound the shores are strewn with drift-wood piled in winrows by the fall storms, and derived originally from the spring freshets of the Youkon and the Kuskoquim. Far above the level which the most severe storms and highest tides now attain lie regular rows of wood, much

* See description of Sinking Point, Chalmers Bay.

decayed but still preserving its shape, and evidently brought there by the waves. This may also be noted on the southeast end of St. Michael's Island, Norton Sound. In the mouth of the "canal" or passage between St. Michael's and the mainland, not far from the fort of the trading company, lie a cluster of basaltic rocks, full of amygdaloidal cavities. The upper portion of these rocks is at least fifteen feet above the level of high water, and a little grass grows there, but in the cavities can still be found, *in situ*, portions of the shelly covering of a species of barnacle, *(balanus,)* which must have lived there when it was daily covered by the tide. The flanks of the Aleutian Islands in many localities bear nearly horizontal tertiary strata, which contain fossil shells, undoubtedly identical as to species, with living forms now abundant in the waters which surround them, showing that they have been elevated within a comparatively short (geological) time.*

The lagoon of Isanotsky, long marked from French surveys in the last century as a navigable passage, though dangerous, is now an impassable *cul de sac.* This, however, may be due to imperfections in the original survey, and not to subsequent elevation.

Captain Riedell, of the bark Constantine, states that in the inner portion of the south harbor of Ounga Island, one of the Shumagins, where he had previously obtained four fathoms, muddy bottom, after the slight earthquake shock of May, 1868, he sounded, obtaining only four feet in the same place. The lower portion of the harbor retained, however, abundance of water. Careful and exact charts of given localities are needed to determine with accuracy the rate of the gradual elevation.

VOLCANIC ACTION.

The violence of the volcanic forces in Alaska is undoubtedly diminishing, while occasional shocks of earthquake are felt, and active volcanoes exist in the Aleutian chain of islands. Many formerly active have become quiet or "extinct," the shocks are less violent and less frequent than formerly, and no eruption has taken place for many years. Grewingk enumerates some fifty volcanic peaks, most of which have been active since the Russian occupation, or bear the evident traces of recent activity. Of these at present eleven only are known to be active by emitting flame or smoke.

Earthquake shocks are light, but not uncommon, particularly among the Aleutian Islands. Shocks are said to be more common in the month of October than at other times. In the Kavi-iak Peninsula, north of Norton Sound, terraneous disturbances are rare. The natives reported such in 1854 and 1862. In August 1867, a perceptible shock was felt at the Russian Mission, on the lower Youkon, about one hundred and fifty miles from the sea. The islands of St. Michael and Stuart, on Norton Sound, are said by native tradition to have originally risen from the sea, and subsequently to have been thrice submerged.

* *Vide* Grewingk, p. 277 *et seq.*, and Plates IV and V.

GLACIAL ACTION.

For opportunities of studying the phenomena of glaciation, American students need no longer turn to the Alps. From Bute Inlet to Ounimak Pass, almost every deep gorge of considerable size between the high mountains, for which this coast is so remarkable, has at its head a glacier, or the remains of one. Some of these glaciers are of extraordinary size and grandeur. The ice, broken from their overhanging terminations, has given rise to such names as Icy Strait and Icy Bay; and smaller fragments, concealed by the adherent mud and stones, have in several instances been taken for permanent rocks by the earlier navigators. The question naturally arises, to what extent have the glaciers aided in producing the extraordinary system of fiords which characterizes this coast? Or is that system due to other causes, and are the glaciers merely incidental?

If the excavation of these innumerable channels and inlets is due to glacial action, we shall naturally look for unmistakable evidences of the fact in the grinding and polishing of the harder rocks which remain; the denudation in great part of the softer and more friable ones; the transportation of large quantities of material, and its deposition off the present coast line, in submarine moraines of which the soundings should give evidence. The ice power which would excavate a channel fifty fathoms deep would leave no uncertain or dubious evidences behind it.

If, on the other hand, we do not look to glacial action for a solution of the problem, we may suggest the hypothesis, that the same power which raised the Coast ranges to their stupendous height; which lifted up the peaks of Crillon, Fairweather, and St. Elias; at the same time upheaved the strata on either side of the main line of elevation, and nearly parallel with it, thus producing deep incised valleys and precipitous mountains, gorges, and ravines, of which the submarine portion, by its position, became an archipelago, while that above the sea, of a similar character, in a latitude and under climatic influences which produced a greater deposition (in the form of snow) than evaporation, became, through its physical conformation, the nurse of glaciers.

The weight of available evidence does not seem to support the first view of the case. The lower summits of gneiss, granite, and dolorite, which must have been covered in past time with the superincumbent ice sheet, if it existed, and to which one would look for such evidences as polishing, striation, and grinding down, offer none such. Their outline, and the rocks of which they are composed, are sharp, and exhibit no evidences of abrasion or erosion.

The absence of terraces, of any extent, has been noticed by Professor Blake, in his account of the glaciers of the Stikine River. Wassnessensky describes none, nor does Whymper, in his description of the immense glaciers of Bute Inlet. Nor in my own observations in the vicinity of Sitka, and the peninsula of Aliaska, have I met with any cases of this most characteristic phenomenon of general glacial action. If the glacier field once extended over the entire coast, previous

to the formation of the archipelago, we may conclude that the more northern portions of the Territory, north of the Alaskan Mountains, would not have been exempt from glacial action. Three years' exploration, with a strong disposition to develop the facts of the case, failed to obtain on the shores of Norton Sound, or in the valley of the Youkon, any evidence whatever of such action. Once only were polished rocks met with, and they proved on examination to be "slickensides;" while no instances of transported materials, scratches, boulders or moraines, were anywhere met with. The rolling and moderately elevated character of the country does not favor the development of local glaciers, such as now exist on the more southern coasts of Alaska.

The soft tertiary strata everywhere, though broken, contorted and sometimes metamorphosed, are not denuded, except from the evident local action of local glaciers.

But little has been learned so far in regard to the rate of motion, and other circumstances connected with the magnificent glacier system of the coast ranges of British Columbia and Alaska. A road, built across one of the glaciers of Bute Inlet by Mr. Waddington, of Victoria, was noticed to have moved some ten feet out of line during the winter season, when the road builders returned in the spring. No regular observations have been made, however.

That the majority of the glaciers are decreasing in size, and hence that the climate is becoming drier or warmer, is evident. The glaciers of Bute Inlet and the Stikine have notably receded, leaving their tracks unmistakably evident. The erosive action of the glaciers is comparatively small; from some of them issue streams of water nearly pure* and they do not give rise to any very extensive shoals off the coast. Quite different is the case with the rivers. The Stikine, the Copper, the Suschitna, all bring down quantities of detritus, annually altering, to some extent, the coast line in the immediate vicinity of their embouchments.

North of the peninsula of Aliaska this river action is going on in a far grander manner. The Nushergak, Kuskoquim, and Youkon Rivers annually discharge from their mouths immense quantities of earthy matter, which is deposited in the fine mud which replaces in Behring Sea the black volcanic sand which comes up on the lead, south of the islands. This mud has formed the largest submarine plateau with so slight a depth of water in the world, covering two-thirds of Behring Sea, and even extending for an indefinite distance through and beyond Behring Strait. A deep sea valley exists, however, on the west side of Behring Sea, between the Alaska plateau and the shoals of Anadyr Gulf, culminating in the mouth of Plover Bay, Eastern Siberia.†

When the spring freshets of the Youkon come down, the water is laden with blocks of ice, each of which transports its share of pebbles, earth, and sand; the current, twelve to twenty fathoms deep, in places, tears away with resistless vio-

* See Whymper, p. 27.

† Captain Fish, of the whaling brig Victoria, reports here $\frac{9}{10}$ in the mouth of the bay; and $\frac{9}{10}$ further up, by W. U. T. Exp.

lence alluvial banks formed years before and carries them along, depositing them little by little, thus changing annually its channel and depth of water, cutting away islands and forming new ones, and lessening slowly, but surely, the depth of water in Behring Sea. I have noticed, on exposed banks, one hundred and thirty annual layers of earth and vegetable matter, in a depth of alluvium of only six feet.

Should the elevation of the land and the annual deposition of earthy material continue, geologically the time is not far distant when a great part of Behring Sea may become dry land, and Asia be joined unto America.

AGE OF THE FORMATIONS.

In the absence of any information to the contrary, what little we possess being favorable, we may assume provisionally the hypothesis that the northern extensions of the coast and Rocky Mountain range in Alaska were elevated at the same geological period as their more southern portions, probably near the end of the triassic period.* At only one point in the territory have older rocks been definitely identified, viz: at Cape Lisburne, on the Arctic coast, where Beechey obtained fossils from carboniferous limestone.† At the bay of Katmai, peninsula of Aliaska, Wassnessensky obtained jurassic fossils, which are described and figured by Grewingk.‡

The cretaceous strata which abound in California and on Vancouver Island have not as yet been definitely traced into Alaska. It is quite possible that some of the numerous coal beds of the archipelago may prove to be of this age.

The most characteristic fossiliferous strata of Alaska are those of tertiary age, some of which have been decided to be miocene. These beds, often broken, contorted, or metamorphic, are found on the flanks of the coast mountains, and have been identified from various points in the Alexander Archipelago, Cape Spencer, Prince William Sound, Cook's Inlet, and along the peninsula of Aliaska, and most of the Fox Islands, and even on St. Paul of the Pribyloff group. North of this, the first authentic locality is on Norton Sound, where we find the tertiary (miocene) strata coming to the sea, between the amygdaloid basaltic lava of St. Michael's and the adjacent mainland, and the metamorphic slates and sandstones of the Shaktolik Hills.

Here they are blue sandstones, containing vegetable remains, leaves of the sycamore, (*Platanus*,) &c. Further inland, on the Youkon, it is surmounted for some forty miles by brown sandstones, containing marine shells, in poor condition. All the fossiliferous rocks which I obtained on the Youkon, in Alaska, appeared to be miocene,§ but the basalt and lava which extend from the Youkon, at the Russian Mission, to the sea near St. Michael's may be, and probably are, more recent.

Remains of pliocene animals, such as the fossil elephant, (*Elephas primigenius*,)‖

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* *Vide* Whitney, Geology of Cala.

† Grewingk, pp. 88 and 271. N. B. The coal at Cape Beaufort may be of carboniferous age.

‡ Grewingk, p. 271, pl. IV.

§ Erroneously reported carboniferous. Proc. Cala. Acad. Sci., 1868, p. 34.

‖ See Osteology of the voyage of the Herald, Professor E. Forbes.

the bison, (*B. priscus? and B. crassicornis*), the musk-ox, (*ovibos moschatus*,) and the fossil horse, (*E. fossilis*,) are found over the whole Youkon valley, but particularly abundant in Escholtz Bay on the Inglutalik, and on the Kotlo river. Beds of marl, composed of fresh-water shells similar to those living in adjacent lakes, are found near Fort Youkon.

The most important of these formations to the navigator or manufacturer is the tertiary. In it are found those coal veins of which more detailed mention is made in previous parts of this volume. These deposits are widely distributed, coal having been reported from many localities since the acquisition of the Territory. The coal is tertiary, (some of it possibly cretaceous), and, like most tertiary coals, is inferior to the carboniferous coals both in quality and thickness of seams. The annexed table will show at a glance the comparative value and composition of the coals of the different formations on the west coast of America and the best carboniferous coals of Pennsylvania and England.

Analyses of coal.

	Locality of the coal.	Moisture.	Fixed carbon.	Volatile combustible matter.	Ash.	Sulphur.	Character.
Carboniferous.	Pittsburg, Pennsylvania	2.34	55.82	34.31	7.16	?	Bituminous.
	Ormsby, Pennsylvania	4.00	66.56	26.93	2.50	?	Bituminous.
	Kentucky	2.00	56.01	37.89	4.10	----------	Cannel.
	Lehigh, Pennsylvania	2.34	88.05	2.94	6.66	----------	Anthracite.
	Newcastle, England	0.99	61.70	33.55	3.75	0.23	Bituminous.
Cretaceous.	Nanaimo, Vancouver's Island	2.98	46.31	32.16	18.55	?	Lignitic.
	Bellingham Bay	8.39	45.69	33.26	12.66	?	Lignitic.
	Mount Diablo, California, best black diamond	14.69	46.84	33.89	4.58	?	Lignitic.
Miocene tert.	Coose Bay, Oregon	20.09	41.98	32.59	5.34	?	Lignitic.
	Carbon Station, Pacific railroad	11.60	51.67	27.68	6.17	2.90	Lignitic.
	Weber River, Pacific railroad	9.45	26.21	58.32	3.64	2.40	Lignitic.
	Cook's Inlet, Alaska	1.25	49.89	39.87	7.82	1.20	Lignitic.

The above table shows at a glance, better than any description could do, the superior quality of the Cook's Inlet coal, not only over all the miocene coals, but also over all the cretaceous coals of the Pacific slope.*

Anthracite has been several times reported from various parts of Alaska. It is probable that the specimens collected may owe their quality to local metamorphism of the rocks by heat rather than to the general character of any large deposit. The Cook's Inlet coal, it will be noted, contains only 0.37 per cent. less

* The analyses of the Alaska coal are due to Professor J. S. Newberry of the School of Mines, Columbia College, New York, and State geologist of Ohio. Professor Newberry is excelled by none in his knowledge of the tertiary coal-bearing deposits of the United States, and says: "This coal is fully equal to any found on the west coast, not excepting those of Vancouver Island and Bellingham Bay." For the use of the analyses I am indebted to the Smithsonian Institution.

combustible matter, and only 0.66 per cent. more ash than good Pittsburg bituminous coal, which difference is fully made up by the 1.09 per cent. more water which exists in the latter. The amount of sulphur is less than in either of the two best tertiary coals on the line of the Pacific railroad, and the amount of moisture is less than in any other American coal tabulated.

The discoverers of these outcrops of coal must recollect, however, that the value of coal is not due to its quality alone. Commercially speaking, a vein of coal less than three feet thick (of clear coal) is of very little value, except for local use. The dip of the strata, its faults or foldings, the solid or crumbling character of the superincumbent strata, the distance from a market, and the facilities for mining, shipping, and transportation; all these are as important in determining the value of a deposit as the character of the coal itself.

Among the other mineral products of Alaska of this age is petroleum. This is found floating on the surface of a lake near the bay of Katmai, Aliaska Peninsula. It is of the specific gravity of 25°, (Beaume,)* quite odorless, and, in its crude state, an excellent lubricator for machinery of any kind.

Talcose and chloritic slate with veins of quartz abound in the island of Kadiak. An analysis of specimens of these rocks by Dr. Newberry shows only about $1 per ton, in gold and silver. He says in regard to them, however: "These specimens come from a system which at other points is probably much richer. The mineralogical character of the specimens is precisely that of the most productive gold-bearing veins known, although silver will not be found in quantity in such an association of minerals." It is not impossible that the gold-bearing alluvium of Cook's Inlet, first examined by Doroschin, was derived, originally, from similar rocks, especially as the island of Kadiak is apparently a prolongation of the peninsula of Kenai, on which the gold-bearing alluvial was found.

The other minerals of which we have information, and which are likely to prove of value, may be briefly alluded to.

Copper, in worn fragments, has long been received from the vicinity of Atna, or Copper River. Nothing is known of the original locality, but the fragments appear, from their condition, to be derived from the refuse of glaciers, or from the beds of streams. The mineral is pure, and sometimes associated, as in Lake Superior, with native silver.

Carbonate of copper has been received from the Kuskoquim River and the vicinity of Cape Romanzoff.

Amber is common in the lignite deposits on the peninsula of Aliaska, (Grewingk,) and I have obtained it from the alluvium in the delta of the Youkon. It is also found in the vicinity of most of the tertiary coal deposits on the Fox Islands, and is an article of ornament with the natives who carve it into rude beads. Sulphur exists near many of the volcanic cones of Aliaska. Localities on Ounimak, Kadiak and Unalaska islands, beside others, are mentioned by Grewingk. It has long been in use, as a means of striking fire, among the natives.

* Newberry, Report to the Smithsonian Institution on Alaska minerals.

Graphite is reported from Kadiak; but specimens of a mineral, much in use by the Indians, as paint, having all the appearance of graphite, proved on examination to be micaceous black oxide of iron. This was from the interior of the Youkon valley.

Iron is distributed over the whole Territory, but none has been observed in quantities worth the trouble of working. Magnetic oxide is not uncommon.

Galena is reported in minute quantities from Whale Bay, about twenty miles south of Sitka,* and near St. Paul Harbor, Kadiak.

Spinel exists in some quantities on St. George's Island, in a decomposed bed of volcanic rock, of a whitish color. The crystals are large, but dark and full of imperfections.

Garnets are reported from several localities, particularly near Fort Simpson.

I am inclined to think that the magnificent beds of white marble reported by the officers of the Coast Survey, from near Sitka, will ultimately prove of great commercial value, if the quality is uniformly as good as the specimens obtained.

Our knowledge of the geology, minerals and rocks of Alaska is extremely meager. It is to be hoped that our energetic traders and trappers will enable us to increase it by collecting and transmitting specimens from clearly identified localities. In this way our stock of information may be rapidly enlarged, and the growth and prosperity of the new Territory promoted.

WM. H. DALL,
Geologist of the late Russian and American
(Western Union) Telegraph Expedition.

NOTE.—Any points bearing on the glacier question being of interest, as tending definitely to settle that much-vexed problem, the following points are noted as worthy of careful examination by all navigators who may be desirous of adding something to the common stock of knowledge.

We may assume that, first, the general course of a continental or continuous coast-glacier will be parallel with the general slope of the coast, irrespective of local topography to any material extent. Second, that as the excavations, rock, scratches, transportation of material, and so on, of course, will trend in the same line, consequently the terminal and other moraines, if any exist, will be found to cross the line of general movement at right angles. Third, it has also been noticed that the smaller hills, or mountains, which lay in the path of the New England glacier sheet, according to Vose and other geologists,† always have the side of the longest slope facing the direction from which the ice sheet came.

Glancing on the chart at the Alexander Archipelago, let us examine this assemblage of islands, inlets, and canals, which invariably, by superficial observers, has been referred to the action of ice.

We find the first assumption directly contradicted. The line of "excavation,"

* T. A. Blake. Report on Geology of Alaska to the United States Coast Survey.
† Memoirs Boston Society of Natural History.

if we still feel disposed to use that term, is at right angles to the water-shed to the general slope of the coast mountains, and to the course of many of the existing local glaciers.

Assuming against reason, for the sake of argument, that this was the line of movement of the glacier sheet, (as it must have been, if any existed,) we should, under the second assumption, look to find across the canals, at intervals, or at least in solitary instances, bars or submarine moraines, composed of the detritus from the glacial sheet, at a time when the rate of melting was equal to its rate of progress, the termination, and point where the detritus was deposited, consequently remaining nearly stationary. If any such exist, which under the circumstances we may reasonably doubt, the soundings would give unequivocal evidences of it. It is perhaps needless to say that as yet we have no such information. In regard to the third point, Mr. Davidson mentions in this volume the fact that the abrupt side of the mountains is almost invariably the east or north east side, which excludes the idea of a glacier sheet from any direction, except from the sea, but agrees well with the hypothesis of an upheaval coeval and parallel with that of the coast ranges.

It is therefore considered unnecessary to pursue the subject of a general glacier sheet any further, and it only remains to discuss the indications by which we may determine the former extent and amount of influence of the local glaciers.

It has already been mentioned that the deposition of detritus, in the form of shoals, off the largest known glaciers of this coast, is very small, especially when contrasted with that deposited by even the smaller rivers. The excavation of such immense inlets and channels by ice action would necessarily form large quantities of eroded material, which must, by its specific gravity, have been deposited somewhere near the coast.

Leaving the Alexander Archipelago for the head of the Gulf of Alaska, at Chugach (or Prince William) Sound and Cook's Inlet, the conformation of the bays and coast is such as to give an air of more probability to the theory of excavation by ice than that received from the aspect of the more southern coast.

It is in this vicinity that any observations would be of the greatest interest as tending to finally settle the question of how much, if any, of the peculiar indentation of the coast is due to the action of local glaciers. We should look for such indications as these.

First. Evident lines of erosion, grinding, and scratching, probably of greatest strength in a parallel direction with the general course of the inlet or sound. These might also be crossed by another series, denoting the action of some limited portion of the glacier, controlled by local topography, in another direction. These marks should be carefully distinguished from such as might have resulted from the action of bay ice in winter, carried about by the tide and wind. Such evidences are clearer and more satisfactory, when obtained at some distance above high-water mark.

Second. Deposition of material in fragments of greater or smaller size, foreign

to the locality where it may be found, and frequently indicating the action of ice, by the polishing or scratching of one or more of the sides of any particular fragment, and especially by boulders whose rounded form is so familiar in the fields and stone fences of New England. Here also care should be taken not to confound stones rounded or smoothed by the action of water alone, with those fashioned in the grasp of an irresistible moving ice-sheet.

Third. A peculiar dome-like appearance is to be noticed in low hills or mountains, over which a glacier has passed, with the longer slope facing the side from which the ice is supposed to have moved. It is on the brow and sides of such hills, when the rock is sufficiently hard, that the most evident traces of polishing and scratching may be found.

Fourth. The rocks and islets in the bays or inlets supposed to have been formed by glacial action would naturally be rounded or polished on their upper surfaces in a manner hardly to be mistaken for the result of sea ice moved by wind and tide.

Finally, at or near the mouth of such openings we might reasonably expect to find water comparatively shallow, from the deposition of fine material, the result of denudation, or bars composed of the larger fragments dropped by the ice sheet, in the form of moraines, or at least in the shape of large accumulations of scattered boulders, gravel, and stones, as in the *loess* of the Mississippi Valley. If, on the other hand, none of these conditions prevail, and none of these proofs of glacial action be obtained, after careful search, then we may justly reject the glacial theory, in its application to the coast of Alaska, and seek another explanation of the remarkable conformation of the coast line which we meet with there.

It is to be hoped that our explorers and navigators will not neglect any opportunity of sounding, or making personal examination of the rocks, that, by their reports and the information they can so readily convey, we may more rapidly arrive at some satisfactory conclusion.

APPENDIX No. 2.

The following list of the geographical positions of places, principally upon the coast of Alaska, has been compiled chiefly from Russian authorities. In its preparation the intention was to introduce all determinations of position that appeared to have been made by actual observation, even when the localities are quite close. In the archipelago Alexander most of Vancouver's latitudes have been introduced, although in such waters they are not of great practical value.

It is believed the latitudes are generally within two miles of the actual position, and in many cases where several observers had determined them independently, the errors may be less than a mile. The longitudes of harbors regularly visited by vessels of the Russian-American Company appear to be fairly determined, except toward the western termination of the Aleutian chain, where large discrepancies, reaching 30′ of arc, are exhibited by the comparison of results between Russian authorities and the United States exploring expedition to the North Pacific in 1855. Positions by different authorities are given in some instances to show these discrepancies. The comparison of latitudes and longitudes at Victoria, Fort Simpson, Sitka, Chilkaht, Kadiak, and Unalaska, between English and Russian and the United States Coast Survey determinations, exhibit larger errors than might have been expected.

The uncertainties that exist in the geographical position of many islands, headlands, straits, and reefs, the great dissimilarity of outline and extent of recent examinations of some of the western Aleutians, the want of reliable data concerning the tides, currents, and winds, the almost total want of detailed descriptions of headlands, reefs, bays, straits, &c., and the circumstantial testimony of the Aleutian fishermen concerning islands visited by them and not laid down upon the charts, point to the great necessity for an exhaustive geographical reconnoissance of the coast, as was done for the coast of the United States between Mexico and British Columbia.

List of the geographical positions.

Locality.	Latitude.	Longitude.	Authority.
	° ′ ″	° ′ ″	
San Francisco, California	37 47 52.8	122 23 19	United States Coast Survey.
Victoria, Vancouver Island	48 25 30.3	123 20 05	United States Coast Survey.
Bellabella, Fitzhugh Sound, B. C	52 10	128 07 50	United States Coast Survey.
Fort Simpson, Dixon Sound, B. C	54 33.7*	130 23 46	United States Coast Survey.
Rose Point, Dixon Sound, B. C	54 12.0	131 23.0	Chroutschoff.
Northwest Point, Lazara Island	54 20.0	133 09.0	Chroutschoff.
ALASKA, ALEXANDER ARCHIPELAGO.			
Entrance to Portland Canal	54 42.0	130 25	Vancouver, Tebenkoff's Atlas.
Head of Portland Canal	55 45	130 02	Vancouver, Tebenkoff's Atlas.
Village in Tchesonsity Harbor	54 46	130 35	Vancouver, Tebenkoff's Atlas.
Devil's Bank, Kygáni Strait	54 39.0	131 34	Chroutschoff.
Cape Chacon, Kygáni Strait	54 42.0	131 53.0	Chroutschoff.
Point Nunez, Kygáni Strait	54 42.0	132 06.0	Admiralty Chart No. 2431.
Cape Kygáni or Muzon	54 42.0	132 43.8	United States Coast Survey.
	54 42.0	132 39.0	Chroutschoff.
Anchorage in middle one of the Kygáni harbors	54 46	132 45.5	Etolin.
CLARENCE SOUND AND ITS ARMS.			
Gardner Harbor	54 49	131 45	Tebenkoff's Atlas.
Tchitichagoff Bay	55 01	131 45	Tebenkoff's Atlas.
Anchorage Tongas Harbor	55 03	131 25	Etolin.
Kazan Bay	55 24	132 00	Etolin.
North entrance to Tongas Narrows	55 26	132 42	Tebenkoff's Atlas.
Cape Casmano	55 29	131 51	Vancouver, Tebenkoff's Atlas.
Port Stewart, South Point	55 38.2	131 45	Vancouver, Tebenkoff's Atlas.
Entrance to Red Bay	56 19	133 07	Admiralty Chart No. 2431.
Etolin Harbor, Wrangell Island	56 31.5	132 20	Zarelbo.
Stikine River, southeast point of entrance	56 40	132 20	Admiralty Chart No. 2431.
Port Protection, southwest point	56 19.2	133 32	Vancouver, Tebenkoff's Atlas.
CHATHAM STRAIT, FREDERICK SOUND, ICY STRAIT, AND THEIR ARMS.			
Cape Decision, Kou Island	56 02	134 58	Vancouver, Tebenkoff's Atlas.
Cape Ommaney, Baranoff Island	56 10.5	134 28.5	Vancouver, Tebenkoff's Atlas.
Port Malmesbury, north point, (Point Harris, Kou Island)	56 17.5	134 07	Vancouver, Tebenkoff's Atlas.
Port Conclusion, southeast point Baranoff Island	56 16.0	134 27	Vancouver, Tebenkoff's Atlas.
Point Ellis, Kou Island	56 31.0	134 14.7	Vancouver, Admiralty Chart No. 2431.
Point Sullivan, Kou Island	56 38	134 16.5	Vancouver, Admiralty Chart No. 2431.
Point Gardner, south end of Admiralty Island	57 01	134 27	Vancouver, Tebenkoff's Atlas.
Skalitch Point, southeast point of entrance to Peril Strait, Baranoff Island	57 24	134 47	Manuscript Russian Map, Tebenkoff's Atlas.
Point Parker, Admiralty Island	57 37	134 40	Vancouver, Tebenkoff's Atlas.
Point Augusta, southeast point of entrance to Icy Strait, Tchitchagoff	58 03.5	135 00	Vancouver, Tebenkoff's Atlas.
Point Couverden, northeast point of entrance to Icy Strait	58 12	135 03	Vancouver, Tebenkoff's Atlas.
Point Retreat, northwest point Barlowe Cove, Admiralty Island	58 24	134 59	Vancouver, Tebenkoff's Atlas.
Point Whitby	58 35	135 13	Vancouver, Tebenkoff's Atlas.
Point St. Mary, north point of Berner Bay	58 43.5	135 02	Vancouver, Tebenkoff's Atlas.

*Latitude from Admiralty Chart No. 2426.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authority.
	° ′ ″	° ′ ″	
Small Island	58 54	135 22.5	Vancouver, Tebenkoff's Atlas.
United States Coast Survey astronomical station on Sandy Island, mouth of Chilkaht River	59 11 45	135 24 10	United States Coast Survey.
Point Macartney, Kuprianoff Island	57 01.5	133 56	Vancouver, Admiralty Chart No. 2431.
Burnt Point, west side of entrance to Perenos naya Bay, Kuprianoff Island	57 03.3	133 10	Manuscript Russian Chart.
Point Napeau, Admiralty Island	57 10	134 02	Vancouver, Tebenkoff's Atlas.
Cape Fanshaw	57 11	133 25	Vancouver, Admiralty Chart No. 2431.
Islet off Point Pybus, Admiralty Island	57 18	133 47	Vancouver, Admiralty Chart No. 2431.
Point Windham	57 31	133 29	Vancouver, Tebenkoff's Atlas.
Point Styleman, north point of Port Snettisham	57 53	133 42	Vancouver, Tebenkoff's Atlas.
Point Salesbury, west side of entrance to Takan arm	58 11	134 55	Vancouver, Tebenkoff's Atlas,
Mouth of Takon River	58 27	133 54	Vancouver, Tebenkoff's Atlas.
East point Spaskii Harbor, Icy Strait	58 06	135 08	Manuscript Chart, Tebenkoff's Atlas.
Anchorage Port Frederick, Icy Strait	58 10	135 28	Tebenkoff's Atlas.
Point Adolphus, Icy Strait	58 18	135 41	Vancouver, Tebenkoff's Atlas.
Anchorage Port Althorp, Icy Strait	58 12.0	136 12.0	Vancouver, Tebenkoff's Atlas.
PACIFIC COAST—ALEXANDER ARCHIPELAGO.			
Cape Kygáni, or Muzon	54 42.0	132 43.8	United States Coast Survey.
Port Zarelbo, south cape	54 48	132 54.0	Meares, Zarelbo.
Forrester Island, south point	54 48	133 29	Meares, Vancouver, Tebenkoff's Atlas.
Wolf Rock	55 01.6	133 24	Vancouver, Tebenkoff's Atlas.
Cape St. Bartolomo	55 12	133 33	La Pérouse, Tebenkoff's Atlas.
West Point, Dolores Bay, Bucarelli Sound	55 18	133 24	La Pérouse, Tebenkoff's Atlas.
Cape Addington, or Adamson	55 27	133 45	Meares, Tebenkoff's Atlas.
Coronation Island, west point	55 55	134 10	Tebenkoff's Atlas.
Hazy Islands	55 55	134 25	Dixon, Tebenkoff's Atlas.
Cape Decision	56 02	134 58	Vancouver, Tebenkoff's Atlas.
Cape Ommaney	56 10.5	134 28.5	Vancouver, Tebenkoff's Atlas.
Red Cape	56 20	134 49	Tebenkoff's Atlas.
Point Lander, south point of Port Banks, or Whale Bay	56 33	134 58	Dixon, Benzeman.
Point Woodhouse, north point of Biorka Island, Sitka Sound	56 53.0	135 29.2	Vasilieff.
Cape Edgecumbe, Sitka Sound	57 00.4	135 46.0	Vasilieff.
Mount Edgecumbe, 2,855 feet high, extinct volcano, Sitka Sound	57 02.8	135 40.1	Vasilieff.
United States Coast Survey astronomical station, Sitka*	57 02 52	135 17 45	United States Coast Survey.
Cross on Greek Church, Sitka	57 02 52	135 16 59	United States Coast Survey.
Cupola of governor's house and light, Sitka	57 02 47	135 17 08	United States Coast Survey.
Mount Vostovia, east-northeast of Sitka, 3,216 feet high, by mercurial barometer, 1865, August	57 03 23	135 12 57	United States Coast Survey.
Lincoln Harbor, Noquashinski Bay		135 25 56	United States Coast Survey.
Cape Georgiana, south point of Salisbury Sound	57 17.5	135 45.6	Portlock, Tebenkoff's Atlas.
Cape Edward	57 39.0	136 15.0	Vasilieff.
Portlock Harbor, (approximately)	57 45	136 12	Portlock, Tebenkoff's Atlas.
South Point of Illeria Bay	57 46	136 16	Illeria.
Point Bingham, south point of Icy Strait, or Cross Sound	58 03.5	136 27	Vancouver, Tebenkoff's Atlas.

* Magnetic declination observed August 7, 1867=28° 50′.8 east.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authority.
	° ′ ″	° ′ ″	
Port Althorp anchorage, Cross Sound	58 12.0	136 12	Vancouver, Tebenkoff's Atlas.
Cape Spencer, north point of Icy Strait	58 12.5	136 34	Vancouver, Tebenkoff's Atlas.
Lituya Bay, or French Port, south point	58 34.5	137 16	La Pérouse, Lipinski.
Lituya Mount, or Mount Crillon	58 48.5	137 11.5	La Pérouse, Lipinski.
Cape Fairweather	58 50.2	137 48.0	Vancouver, Lipinski.
Mount Fairweather, 13,864, 13,946, 14,708 feet	58 57.0	137 27.0	Vancouver, Lipinski.
Cape Phipps, south point of Yakutat or Behring's Bay	59 33.0	139 42.0	Vancouver, Lipinski.
Cape Turner, Khantaak Island, Behring's Bay	59 33.0	139 35.0	Vancouver, Lipinski.
Elenora Harbor, Behring's Bay	59 43.0	139 21.0	Malespina, Tebenkoff's Atlas.
Point Latouche, entrance to Disenchantment Bay, Behring's Bay	59 51	139 25.5	Vancouver, Tebenkoff's Atlas.
Point Manby, western point of Behring's Bay	59 43	140 06.0	Tebenkoff's Atlas.
Cape Riou, east point of Icy Bay	59 53	141 14	Vancouver, Tebenkoff's Atlas.
Mount St. Elias, 14,970, 16,938, 17,854 feet	60 22.6	140 54.0	Vancouver, Tebenkoff's Atlas.
Pamplona Reef	59 03	142 39	Position very uncertain.
Cape Iaktaga	59 58	142 12	Tebenkoff's Atlas.
Laeda Reef	59 58	143 43	Tebenkoff's Atlas.
Cape Suckling, eastern part	59 59	144 11	Vancouver, Tebenkoff's Atlas.
Cape Hammond, or St. Elias, south end Kayak Island	59 49	144 53	Vancouver, Tebenkoff's Atlas.
North Point, Wingham Island	60 05.5	144 57	Vancouver, Tebenkoff's Atlas.
Sea-otter Banks	59 44	145 57	Lindenberg.
North Point, Otchek, or Middleton Island	59 30	146 30	Tretzeroff.
Eastern mouth of Copper or Atna River	60 17	145 57	Tebenkoff's Atlas.
Alaganik Village, Copper River	60 41.3	145 49	Serebranikoff.
Western mouth of Copper River	60 30	145 54	Serebranikoff.
Cape Hinchinbrook	60 16	146 47	Vancouver, Tebenkoff's Atlas.
Fort Constantine, Port Etches	60 20 18	146 52 50	Chernoff, Belcher.
Cape Cleare, south point of Montague Island	59 46	148 01	Vancouver, Tebenkoff's Atlas.
McLeod's Harbor, Montague Island	59 58	147 54	Vancouver, Tebenkoff's Atlas.
North point of Chalmers Harbor, Montague Isl'd	60 16	147 22	Vancouver, Tebenkoff's Atlas.
Cape Resurrection	59 51.5	149 13.4	Archimandritoff.
Seal Rocks, south of Chiswell Islands	59 34	149 32	Tebenkoff's Atlas.
Pye Islands, southernmost	59 20	150 28	Tebenkoff's Atlas.
Tchugatch or Chugach Islands, south point of the eastern one	59 06	151 25	Vancouver, Tebenkoff's Atlas.
COOK'S INLET.			
Cape Elizabeth	59 09	151 51	Vancouver, Tebenkoff's Atlas.
Anchorage in Port Chatham	59 13.5	151 42	Vancouver, Tebenkoff's Atlas.
Point Bede	59 19.5	151 58.6	Archimandritoff.
Village in Coal Bay, Graham Harbor	59 24.0	151 49.5	Archimandritoff.
Coal Point, Tchugatchik Bay	59 37.2	151 22.6	Archimandritoff's MS. chart.
Anchor Point	59 50.9	151 52.8	Chernoff and others.
Fort St. Nicholas, Kakuu River	60 32.2	151 19.3	Heldt.
East Foreland	60 43.0	151 27.3	Vancouver, Malakoff.
Point Possession	61 03.5	150 25.5	Vancouver, Malakoff.
Islet near Turnagain Arm	60 57.7	150 01.6	Vancouver, Tebenkoff's Atlas.
Point Varonzoff, entrance to Kneek (i. e. fire) River	61 08.0	150 07.5	Vancouver, Tebenkoff's Atlas.
Turnagain Island, west point	61 08.0	150 15	Vancouver, Tebenkoff's Atlas.
West point Suchitna River	61 16.5	150 39	Tebenkoff's Atlas.
North Foreland	61 04.0	151 07.5	Vancouver, Tebenkoff's Atlas.
West Foreland	60 44.0	151 45.9	Tebenkoff.
Northwest point Kalghin Island	60 33.0	151 57.0	Tebenkoff.
Redoubt Volcano, 11,270 feet, (snow-covered)	60 28.0	152 38.0	Tebenkoff.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
	° ′ ″	° ″	
Iliamna Volcano, 12,066 feet, (snow-covered)	*60 05.6	153 07.5	Tebenkoff.
Iliamna Village, portage to Iliamna Lake, and Bristol Bay	59 42.0	154 11.0	Ustingoff.
Mount San Augustin, on Blackbrown Island	59 22.0	153 30	Vancouver, Tebenkoff's Atlas.
Cape Douglas	58 52.5	153 16	Vancouver, Vasilieff.
Portlock Bank, 80 fathoms, 120 miles north 73° east from St. Paul	58 22	148 44	United States Coast Survey.
KADIAK ARCHIPELAGO, AND PETRIES OR SHELIKOFF STRAIT.			
Barren Islands, east point of Amatuli Island	58 57.6	151 53.0	Benzeman and others.
Southwest point of Ugutchtu Island	58 54.0	152 19.7	Benzeman and others.
Point Banks, north end of Portage Island	58 39.5	152 19.5	Benzeman and others.
Sea-otter Island	58 32.0	152 13.5	Vasilieff.
North point of Afognak Island	58 29.5	152 31.5	Vasilieff.
Afognak Rocks	58 21.6	151 49.9	Benzeman.
South Point St. Hermogenes Island	58 09.5	151 52	Vancouver, Benzeman.
Pillar Point	58 08.6	152 04.8	Benzeman.
Cape Ijoot, (Pentecost)	58 06.3	152 17.0	Murashat.
Rubetz Village, Marmot Bay	58 01.3	152 41.0	Archimandritoff.
Northeast point Ketoy Island, Northern Strait	57 59.5	152 39.0	Benzeman.
Chiniak Point Reef, west entrance Narrow Strait	57 55.8	152 31.0	Archimandritoff.
Southeast point Spruce Island	57 53.0	152 20.0	Archimandritoff,
Vasilieff or Williams Bank	57 50.2	152 07.0	United States Coast Survey, (approximate)
Spruce Point	57 49.6	152 16.1	United States Coast Survey.
United States Coast Survey observatory, south point Chagavka Cove, St. Paul Harbor	57 48 00	152 18 56	United States Coast Survey.*
Flagstaff, St. Paul Village	57 47 45	152 20 57	United States Coast Survey.
Pillar on Mount St. Paul, (1,001 feet high)	57 47 38	152 21 59	United States Coast Survey.
North peak of Devil's Mountains, 2¼ miles northwest of St. Paul, 2,057 feet high	57 49 30	152 23 41	United States Coast Survey.
Ice depot on Woody Island	57 46 57	152 18 37	United States Coast Survey.
Station near north end Woody Island	57 42 36	152 16 58	United States Coast Survey.
Cape Greville†	57 36 47	152 06 58	United States Coast Survey, (approximate.)
Tolstoi or Broad Cape†	57 34.6	152 05.0	United States Coast Survey, (approximate.)
Low Cape	57 25.7	152 14.0	Archimandritoff.
Noisy Cape	57 23.5	152 30.0	Archimandritoff.
Ugak Island, southeast point	57 22.2	152 13.0	Archimandritoff.
Southwest cape of Kiliouda Bay	57 14.3	152 50.6	Archimandritoff.
Cape Barnabas	57 10.0	152 48.0	Vancouver, Archimandritoff.
Harbor of Three Saints	57 06.8	153 25.5	Lisianski, Archimandritoff.
Misofski Cape	57 00.0	153 14.0	Archimandritoff.
Double Headed Point, Nazikak Island	56 53.6	153 34.2	Vancouver, Archimandritoff.
Chachkak Village	56 50.7	153 48.0	Archimandritoff.
East point of Geese Islands	56 45.8	153 48.0	Archimandritoff.
Cape Trinity, east point of Trinity Islands	56 35.3	153 53.0	Vancouver, Archimandritoff.
South Cape of Trinity Islands	56 24.0	154 42.0	Archimandritoff.
North Point of Ukamok or Chirikoff Islands	55 54.9	155 24.0	Kashevaroff and Lindenberg.
Cape Tolstoi, south point of Ukamok Island	55 45.6	155 28.0	Kashevaroff and Lindenberg.
Village in southwest cove of Ukamok Island	55 48.0	155 34.0	Kashevaroff and Lindenberg.
Naigak Rock	55 50.0	155 38.0	Kashevaroff and Lindenberg.

* Magnetic declination (observed) = 26° 04′.1, August 28, 1867.
† From Coast Survey bearings and reduction of Archimandritoff.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
	° ′ ″	° ′ ″	
South island of Semiden group	56 04. 5	156 21. 5	Tebenkoff's Atlas.
Agayak Island, northern of Semiden group	56 15. 0	156 26. 0	Kashevoroff and Lindenberg.
South point Kadiak Island	56 45. 0	154 09. 0	Archimandritoff.
Cape Alitak, west point of Alitak Bay	56 52. 2	154 17. 6	Archimandritoff.
Low Cape, Alitak Bay	56 59. 0	154 28. 0	Archimandritoff.
Cape Icolik	57 17. 0	154 42. 3	Archimandritoff.
Karlook Village, mouth of Karlook River	57 34. 6	154 24. 5	Archimandritoff.
Cape Uyak, southwest point of Uyak Bay	57 50. 9	153 51. 1	Archimandritoff.
Cape Ugat	57 53. 8	153 38. 7	Archimandritoff.
Cape Uganik, Northern Strait	57 58. 9	153 12. 0	Archimandritoff.
Raspberry Cape, Northern Strait	58 02. 3	153 20. 0	Benzeman.
Steep Cape, Afognak Island	58 12. 6	153 04. 9	Vasilieff.
Cape Paramanof, Afognak Island	58 17. 0	152 57. 3	Vasilieff.
Black Cape, Afognak Island	58 25. 0	152 45. 0	Vasilieff.
SOUTHEAST SHORES OF ALASKA PENINSULA, AND ISLANDS OFF IT.			
Southeast point Kaughpaulik Island	58 36	153 33	Tebenkoff's Atlas.
Village north side Kukak Bay	58 21	154 05	Tebenkoff's Atlas.
Cape Atutchagbik	58 04. 7	154 19. 7	Vasilieff and others.
Katmay Village, on Katmay River and Bay	58 02. 6	154 52. 8	Vasilieff and others.
Cape Kubugakchli	57 52. 6	155 00. 0	Vasilieff and others.
Mount Botscharoff	57 30. 6	155 55. 0	Vasilieff and others.
Olay Peak	57 26. 0	156 10. 0	Vasilieff and others.
Tshughiunayak Peak	57 05. 0	156 35. 0	Vasilieff and others.
Augnak-Rock	56 54	156 21	Tebenkoff's Atlas.
Cape Kumlint	56 33. 2	157 26. 0	Vasilieff and others.
Sutkhum Village, Kidjulik Bay	56 31. 9	157 28. 0	Voronkoffski
East point Amkulik Island	56 18. 0	157 24	Tebenkoff's Atlas.
Tulioumnint Point	56 15. 0	157 46. 0	Kuritzin and others.
Itkhi Cape, east side of Kuioukta Bay	55 58. 0	158 27. 0	Kuritzin and others.
Anchorage Kuprianoff	55 45. 8	159 15	Voronkoffski.
Cape Ivanoff	55 33. 0	159 30	Vasilieff and others.
West point of Korovenski Island	55 25. 2	160 23. 5	Kashevoroffski and others.
Unga, North Harbor, house on west shore of bay, Unga Island	55 24	160 49	Tebenkoff's Atlas.
Village in Delaroff Bay, southeast point of Unga Island	55 10. 8	160 27	Kashevoroffski and others.
North point Tiagkhinak Island	54 55. 0	159 13	Kashevoroffski and others.
South point of Nuniak Island	54 39. 0	159 31	Kashevoroffski and others.
Shumagin Bank, 40 fathoms, coral and sand, 35 miles east of south point of Nuniak Island	54 38	*158 30	United States Coast Survey
South point of Bird Island	54 46. 5	159 40	Kashevoroffski and others.
Mountain Cape, south end of Nagay Island	54 51. 0	160 06	Kashevoroffski and others.
Seal Point	55 20. 0	161 09	Kwitzin and Gardner.
Village Pavloff, in Pavloff Bay	55 29. 7	161 31. 5	Kwitzin and Gardner.
Volcano Pavloff, west side of Paoloff Bay	55 26. 0	161 49. 0	Kwitzin and Gardner.
Village Belkoffski, (Squirrel,) south of Medvidnikoff Bay	55 05. 0	161 54. 0	Kwitzin and Gardner.
Amagat Island	54 52. 4	162 50. 0	Kashevoroffski and others.
Cape Peter, west end Sannak Island and Harbor	54 28	162 52	Paoloff.
Cape Pankoff, south point of Ukatok Island	54 38. 5	162 58. 0	Tebenkoff's Atlas.
Cape Khabutch, east point of south entrance to Isanotski Strait or False Pass	54 48. 5	163 12. 0	Voronkoffski.

* Approximate.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
ALEUTIAN ISLANDS.	° ′ ″	° ′ ″	
Unimak Island, Cape Isanotski, southwest point of entrance to Isanotski Strait or False Pass	54 47.4	163 14.0	Voronkoffski.
Cape Lazaref, southeast point of island	54 35.5	163 30.2	Voronkoffski.
Cape Kitchnak, south point	54 20	164 33	Voronkoffski, Tebenkoff's Atlas.
Khitkhuk Cape, Unimak Strait	54 21.1	164 47.0	Voronkoffski.
Western Head, Unimak Strait	54 30.0	165 01.5	Voronkoffski.
Cape Mordvinoff	54 47.0	164 38.7	Kuritzin.
Red Creek Point, northwest point of entrance to Isanotski Strait or False Pass	55 05.9	163 33.0	Kuritzin.
Chunoff Strait, Isanotski Strait	55 02.0	163 24.5	Voronkoffski.
Volcano Shishaldin, 8,953 feet, (snow-covered)	54 48.0	163 59.5	Kuritzin.
Isanotski or Volcano Devastation, 5,525 feet, (snow-covered)	54 39.0	164 32.0	Kuritzin.
Cod Bank off Krinitzin Islands, south 35° east from Peak of Ukamok Islands, 50 fathoms gravel and sand	53 36	164 12	* United States Coast Survey.
† Remarkable peak near northeast point of Ukamok Island, Strait of Unimak	54 16.9	164 47.1	Beechey.
† East point of Ukamok, south side Strait of Unimak	54 12.0	164 45.0	Kuritzin.
North Cape of Akan Island, southwest point of Unimak Strait	54 16.5	165 34.0	Kuritzin.
Southeast Cape of Tigalda Island	54 03.5	164 57	Tebenkoff's Atlas.
Sigakh Cape, north end of Akutan Island	54 12.2	165 54.0	Kuritzin.
South Cape Akutan Island, north side Akutan Strait	54 01.5	165 59.2	Kuritzin, Tebenkoff's Atlas.
North Cape Unalga Island, south side Akutan Strait	53 58.8	166 03.0	Kuritzin.
UNALASKA GROUP.			
Ugalgan Island, southeast point Beaver Bay	53 52.3	166 00.0	Kuritzin.
Entrance of Udagakh Strait, to Beaver Bay	53 42.5	166 07.5	Tebenkoff's Atlas.
Southern extremity of reef off Cape Kungitak	53 19	166 42	Kuritzin.
Entrance to [illegible] Bay	53 25.5	166 49	Saritcheff.
Southwest point of Unalaska	53 18.7	167 33.0	Kuritzin.
North Cape Chernoffski Bay	53 26.0	167 17.5	Saritcheff.
Crown Cape, north point of Crown Bay	53 44.5	166 49.5	Tebenkoff's Atlas.
Loaf Cape	53 50.0	166 58.0	Kuritzin.
Cascade on east side Cape Cheerful	53 56 58	166 32 47	* United States Coast Survey.
Light-house site on north head of Amaknak Island	53 55 38	166 27 44	United States Coast Survey.
United States Coast Survey astronomical station, Ulachta Harbor, Unalaska Bay	53 53 58	166 27 52	United States Coast Survey.
Greek Church, [illegible] village, Unalaska Bay	53 52 39	166 29 06	United States Coast Survey.
Cape Kalekhta, 1,500 feet high, east point of Unalaska Bay	54 00.2	154 18.7	United States Coast Survey.
Volcano Makushin, 5,691 feet	53 52.5	166 45	Tebenkoff's Atlas.
‡ Volcano Island Bogoslof or Providence, about 1,000 feet high	53 52.0	167 39.0	Kuritzin.
UMNAK ISLAND.			
Cape Tannakh, north point of the island	53 31.0	167 35.0	Kuritzin.
Tulikskaya Peak, near the north end of island	53 23.0	167 46.0	Kuritzin.

* Approximate.

† These positions cannot be reconciled; the peak should be about a mile south of the cape.

‡ Joánna Bogoslóva (St. John, the theologian.)

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List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
	° ′ ″	° ′ ″	
Vseridoff Peak	53 14.0	168 09.0	Kuritzin.
Vseridoff Island, eastern point	53 00.3	168 06	Kuritzin.
Cape Sagakh, southwest point of Umnak	52 45.5	168 49.0	Kuritzin.
South point of Samalga Island	52 41.0	168 57.0	Kuritzin.
ISLANDS OF THE FOUR VOLCANOES.			
Peak on Kagamil Island	52 57.0	169 25.0	Kuritzin.
Peak on Chuginadak Island	52 45.0	169 21.0	Kuritzin.
South point Chuginadak Island	52 40.9	169 44.9	Kuritzin.
Northeast peak Yunaska Island	52 40.5	170 12.0	Gavriloff.
Southwest peak, Volcano, Yunaska Island	52 38.0	170 21.5	Gavriloff.
Chugnel Island, middle of peak	52 38.0	170 47.0	Gavriloff.
Middle of Amukhta Island			
Amukhta Strait	52 35.5	170 52.0	Gavriloff.
Siguam Island, northeast point	52 25.0	172 09.0	Ingestrem and others.
Siguam Island, southwest point Amukhta Strait	52 18.0	172 25.0	Ingestrem and others.
East point of Amelia Island, a high rock off it	52 06.2	172 46.7	Salamatoff and others.
Southwest point Svetchnikoff Bay, south side of Amelia Island	52 02.3	173 10.5	Salamatoff and others.
West point of Amelia Island, Amelia Strait	52 06.5	173 51.3	
Idaluk Point, middle of north side of Amelia Island	52 08.7	173 19.0	
ATKHA ISLAND.			
Cape Utaleg, southeast point of Atkha Island, Amelia Strait	52 08.0	173 54.7	Salamatoff and others.
Anchorage in Nazarn Bay, east side of Atkha Island	52 10.5	174 00.5	Salamatoff and others.
Cape Tadlukh, south side of island	51 58.0	174 42.0	Ingestrem and others.
Cape Kigun, west point of island	52 00.0	175 40.0	Ingestrem and others.
Broad Cape, north side of island	52 06.5	174 45.1	Ingestrem and others.
Salt Island	52 10.0	174 31.5	Ingestrem and others.
Egg Point, south point of Korovenski Bay	52 11.9	174 22.5	Vasilieff.
Priest's house, Nicolski village, Korovenski Bay	52 17.2	174 17	Etolin, Gibson.
Cape Korovenski	52 18.5	174 21.7	Pavloff.
Korovenski Peak, extinct volcano 4,852 feet high	52 23.5	174 02.0	Pavloff.
North Cape	52 25.3	173 58.7	Pavloff.
East Cape	52 16.0	173 48.5	Pavloff.
Koniougi Island, middle	52 13.6	175 00.8	Ingestrem and others.
Swallow Island, middle	52 12.0	175 26.5	Ingestrem and others.
Ogmodakh Island, Atkha Strait	51 58.0	175 21.5	Tebenkoff's Atlas.
Sitkhin Peak, Sitkhin Island, extinct volcano 5,033 feet high	52 03.5	176 06.4	Ingestrem and others.
ADAKH ISLAND.			
Cape Adagdakh, north point of island	52 01.0	176 36.3	Salamatoff and others.
Cape Kagigikhakh, south point of island	51 31.5	176 46.7	Salamatoff and others.
Cape Yakhakh, southwest point of island	51 32.5	177 06.0	Salamatoff and others.
KANAGA ISLAND.			
Northwest Cape, Kanaga Island	51 57.0	177 19	Salamatoff and others.
Kanaga Peak, near Northwest Cape	51 54.5	177 16	Salamatoff and others.
Cape Chun, south point of Kanaga Island	51 38.0	177 36.5	Salamatoff and others.
Peak of Sea-otter Island, extinct volcano with marked terraces	51 55.3	177 30.5	Salamatoff and others.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
TANAGA ISLAND.	° ′ ″	° ′ ″	
Cape Sudakh, northeast point of island	51 52.0	177 38.0	Salamatoff and others.
Point Saslikh, south point of island	51 34.0	177 56.0	Salamatoff and others.
Anchorage in Pride of Russia Bay, west side of island	51 47.0	178 02.0	Salamatoff and others.
North Cape of Goroloi (Burnt) Island, volcano, very high	51 50.0	178 48.0	Salamatoff and others.
South Cape of Goroloi (Burnt) Island, volcano, very high	51 43.5	178 44.0	Salamatoff and others.
Illakh Island, Tanaga Strait	51 26.6	178 22.5	Salamatoff, Gibson.
Amatignakh Island, highest part	51 19.0	179 08.5	Gibson.
	51 12.0	179 05.0	Salamatoff.
North point of Semisopokh, or the Seven Peaked Mountain. Active volcano on this island	52 02.0	180 22	Zarembo, Gibson.
West Cape of Semisopokh Island, 1,411 feet high	51 57.5	180 30.5	Gibson.
	.....	180 24	Klinkofstrom.
Sugarloaf Peak, south point of Island, 1,760 feet high	51 54.0	180 21.5	Gibson.
	.....	180 16.0	Klinkofstrom.
East Cape of Amitkhitka Island	51 24.2	180 29.5	Gibson.
	51 20.0	180 27.0	Klinkofstrom.
Cape Ptikhi, west point of Amitkhitka Island, 1,008 feet high	51 38.0	181 22.0	Gibson.
	51 37.0	181 08.0	Klinkofstrom.
Anchorage in Kiriloff Bay, north side of Amitkhitka Island	51 25.5	180 45.0	Gibson.
	51 36.0	180 41	Justromom.
South Point, Constantine Bay, northeast part of Amitkhitka	51 24.0	180 38.0	Gibson.
	51 24.0	180 37.0	Klinkofstrom.
South Point, Little Sitkhin Island	51 54.5	181 31.5	Gibson.
	51 55.5	181 14.8	Tebenkoff's Atlas.
Peak on Little Sitkhin Island	51 58.0	181 28.0	Gibson.
East point of Rat Island	51 46.0	181 43.0	Gibson.
	51 37	181 23	Tebenkoff's Atlas.
Peak of Davidoff Island	51 58.6	181 42.2	Gibson.
Peak of Khoostoff Island, 1,873 feet high	52 08	181 41	Gibson.
Southwest Peak of Chugul Island	52 07	181 57	Gibson.
	51 58.0	181 37.0	Klinkofstrom.
Middle of Tanadok Island	51 56.5	182 09.5	Gibson.
	52 00.0	182 02.0	Klinkofstrom.
Northeast Cape of Great Kysa Island, 1,987 feet high	52 11.0	182 22.4	Gibson.
	52 10.0	182 10.0	Chernof.
Kysa Bay, mouth of stream east side of island	51 59.1	182 34.0	Gibson.
	52 03.0	182 19.5	Ingestrem and others.
Southwest Cape of Kysa Island	51 53	182 51	Gibson.
	52 01.0	182 24.0	Ingestrem and others.
East Cape Buldir Island, 302 feet high	52 34	184 11	Gibson.
	52 24	184 10.4	Ingestrem and others.
West point Alaid Island, of the Simitkhi group, 818 feet high	52 45.4	186 09.5	Gibson.
	52 45.4	185 37.0	Etolin.
Northeast Cape Agattu Island	52 27.6	186 24	Benzeman and others.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
	° ′ ″	° ′ ″	
Cape Sabakh, southeast point of Agattu Island	52 19. 0	186 21	Benzeman and others.
West Cape of Agattu	52 25. 8	186 54	Benzeman and others.
ATTU ISLAND.			
East Cape	52 51. 6	186 36. 7	Gibson.
	52 50. 6	186 15. 0	Etolin.
Tchitchagoff Harbor, flagstaff	52 55. 7	186 47. 3	Gibson.
	52 56. 1	186 36. 5	Etolin.
Cape Cross, northwest part of island, 2,281 feet high	52 02. 4	187 24. 0	Gibson.
	52 02. 5	186 52. 0	Benzeman and others.
* Cape Wrangell, west point of the island	52 58. 0	187 34. 0	Gibson.
	52 57. 0	187 08. 0	Benzeman.
Massacre Point, west side of Massacre Bay	52 49. 8	186 55. 0	Gibson.
	52 48. 8	186 25. 0	Benzeman and others.
NORTH COAST OF ALASKA PENINSULA AND WEST SHORES OF AMERICA TO THE ARCTIC OCEAN.			
Point Krenitzin, northeast point of the entrance to Isanotski Strait, or False Pass	55 04. 2	163 15. 0	Staninkovitch.
South point of Amak Island	55 25. 0	163 01. 5	Staninkovitch.
Cape Glasenoff	55 14. 8	162 50. 7	Staninkovitch.
East point of Wolf Island, Möller Bay	56 00. 7	160 41. 0	Staninkovitch.
Cape Seniavin	56 23. 7	160 02. 7	Staninkovitch, Botscharoff.
Black Peak	56 35. 2	158 46. 6	Botscharoff.
Cape Strogonoff	56 48	158 46	Khoudobine.
BRISTOL BAY.			
Cape Menschikoff	57 30. 4	157 58. 5	Staninkovitch.
Mouth of Sulima River	57 38	157 48	Khoudobine.
Mouth of Ugatchak	58 12. 7	157 30. 0	Staninkovitch.
Village Pongoik, mouth of Nakuck River	58 42. 8	157 01. 4	Staninkovitch, Khoudobine.
Mouth of Kvitchak River	59 00. 0	156 58. 0	Wrangel, Ustiugoff, and others.
Cape Etolin	58 38. 0	158 06. 0	Wrangel, Ustiugoff, and others.
Fort Alexander, on Nutchagak River	58 57. 1	158 18. 4	Wrangel, Ustiugoff, and others.
Cape Constantine	58 24. 2	158 44. 0	Wrangel, Ustiugoff, and others.
Kayatchek Island, middle	58 37. 0	159 44. 0	Vasilieff and others.
Calm Cape, southeast point Hagenmeister Isl'd	58 35. 0	160 48. 0	Vasilieff, Cook, and others.
Cape Newenham	58 42. 0	162 05. 0	Vasilieff, Cook, and others.
Northwest point of Goodnews Bay	59 03. 9	161 47. 0	Khramtchenko.
Village Chinyagmiout, Kuskoquim River	59 52	161 43	Russian Admiralty Chart No. 6.
	60 08	.....	Russian MS. Chart.
Cape Romanzoff	61 52. 0	166 17	Etolin.
NORTON SOUND.			
West point Stuart Island	63 35. 5	162 32. 6	Tebenkoff.
South point Stuart Island	63 30. 0	162 13. 0	Kellett.
Highest point of Stuart Island	63 35. 0	162 21. 5	Tebenkoff.
Fort St. Michael	63 28. 0	161 51. 9	Kellett.
	63 28	161 44	Zagoskin.
Factory at the mouth of Unalakliḱ River	63 52. 6	160 40. 0	Kashevaroff.
	63 53 33	160 30 16	Zagoskin.

* The westernmost land of the United States.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
	° ′ ″	° ′ ″	
Besborough Island, middle	64 06.6	161 07.0	Khramtchenko.
Cape Denbigh	64 22.0	161 24.0	Khramtchenko.
Cape Darby	64 17.6	162 38.0	Khramtchenko.
Rocky Cape, Golovnin Bay	64 21.0	162 55.0	Tebenkoff and others.
Cape Nome	64 23.0	165 05.0	Tebenkoff and others.
BEHRING STRAIT.			
Azgiak, or Sledge Island, middle	64 29.6	166 01.5	Beechey's Chart.
	.....	166 08	Beechey's Chart.
Cape Rodney	64 39	166 18	Beechey's Chart.
Cape Spencer, Kavi-iak Bay, Port Clarence	65 16.7	166 47.8	Beechey's Chart.
Cape Nikhta, or Prince of Wales, western point of the mainland of the United States and of North America	65 33.5	167 59.2	Beechey's Chart.
ARCTIC OCEAN, KOTZEBUE SOUND.			
Cape Spanberg	66 42	163 34	Beechey and others.
Peak of Chamisso Island, 231 feet	66 13.2	161 46.0	Beechey.
Cape Blossom	66 49	162 24	Beechey and others.
Cape Kruzenstern	67 09	164 37	Beechey and others.
Point Hope	68 19.5	166 46	Beechey and others.
Cape Lisburne, 849 feet	68 56	166 08	Beechey and others.
Cape Beaufort, (vein of coal)	69 13	163 34	Beechey and others.
Icy Cape	70 20	161 40	Beechey and others.
Point Belcher	70 43	159 36	Beechey and others.
Point Barrow, highest latitude of the United States	71 27	156 15	Beechey and others.
Tangent Point, east cape of Dease Inlet	71 10	154 50	Beechey and others.
Cape Halket	70 49	152 16	Admiralty Chart No. 2435.
Manning Point	70 07.5	143 42	Admiralty Chart No. 2435.
Demarcation Point, eastern point of the United States on the Arctic Ocean	69 40	141 07.5	Admiralty Chart No. 2435.
Islands of the Behring Sea.			
ST. GEORGE ISLAND.			
Waterfall Cape, or southeast point of the island	56 34.3	169 31.5	Archimandritoff's MS. Chart.
East Cape	56 37.1	169 27	Archimandritoff's MS. Chart.
West Cape	56 38.3	169 44	Archimandritoff's MS. Chart.
ST. PAUL AND ADJACENT ISLES.			
Beaver Isle	57 03.0	170 19	Archimandritoff's MS. Chart.
	.....	170 00	Tebenkoff.
Walrus Isle	57 11.5	169 49.5	Archimandritoff's MS. Chart.
	57 09.9	169 34.6	Tebenkoff.
Anchor Cape, south point of St. Paul Island	57 08.0	170 12	Archimandritoff's MS. Chart.
	57 06.2	169 54.6	Tebenkoff.
North cape of St. Paul	57 16.4	170 00.2	Archimandritoff's MS. Chart.
West cape of St. Paul	57 11.2	170 19.3	Archimandritoff's MS. Chart.
	57 10.2	170 01.1	Tebenkoff.
Highest point of St. Paul	57 11.4	170 06.4	Archimandritoff's MS. Chart.
	57 09.6	169 49.0	Tebenkoff.

List of the geographical positions—Continued.

Locality.	Latitude.	Longitude.	Authorities.
ST. MATHEW AND ADJACENT ISLES.			
	° ′ ″	° ′ ″	
Pinnacle Isle, 930 feet	60 13. 0	172 34. 5	Lutke.
Cape Upright, southeast point of St. Mathew	60 18. 0	172 04. 0	Lutke.
Sugarloaf Peak, 1,350 feet	60 19. 2	172 29. 0	Lutke.
Cape Glory of Russia, north point of St. Mathew.	60 38. 0	172 40. 0	Lutke.
North Cape, Walrus Island	60 44. 0	172 52. 0	Pavloff.
NUNIVAK ISLAND.			
Cape Ignatieff, south point of island	59 48. 0	166 13. 0	Vasilieff.
Cape Vasilieff, southeast point of island	59 57. 7	165 24	Tebenkoff's Atlas.
Cape Boyle, west point of Nunivak Island	60 11. 5	167 07. 6	Vasilieff.
Cape Etolin, north point of Nunivak Island	60 31	165 50	Tebenkoff's Atlas.
Peak of Ukivok (or King) Island, 586, 756, feet	64 58. 5	167 58. 0	Khramtchenko and others.
ST. LAWRENCE ISLAND.			
Southeast Cape	62 57. 0	169 24. 5	Pavloff.
Cape Anderson, east point of island	63 17. 0	168 35. 0	Pavloff.
Northwest Cape	63 51. 2	171 29. 0	Beechey.
Southwest Cape	63 20. 4	171 33. 0	Tebenkoff.
Anchorage off Kiallagak village, near Southeast Cape	63 00. 4	169 19. 5	Pavloff.
North Point of Pinnik Isles	63 05. 0	168 42. 8	Pavloff.
DIOMEDE ISLANDS, BEHRING STRAIT.			
Ugiyak or Fairway Rock, middle	65 38. 7	168 43. 7	Beechey.
South point of Ingalicuk Island	65 46. 3	168 55. 2	Beechey.
Middle of channel between the Diomede Islands, being the boundary line between Russia and United States	65 48. 6	168 56. 5	Admiralty Chart No. 2435.
	65 47. 8	168 58. 0	Tebenkoff's Atlas.
RUSSIA, DIOMEDE ISLANDS.			
Northwest point of Imaklit Island	65 51. 2	169 03. 7	Beechey.
Mount Kennicott, 2,343 feet, Plover Bay, East Siberia	64 33	173 18 30	Lieutenant Davis, United States revenue service, August, 1865, Western Union Telegraph Expedition.
Between the heads, Plover Bay	64 23 30	173 26	Lieutenant Davis, United States revenue service, August, 1865, Western Union Telegraph Expedition.
Lower anchorage of same	64 26 09	173 20	Lieutenant Davis, United States revenue service, August, 1865, Western Union Telegraph Expedition.
East Cape of Asia	66 03. 1	169 43. 8	Beechey.

APPENDIX NO. 3.

[From Lisiansky's Voyage Round the World in 1803, 1804, 1805, and 1806.]

Vocabulary of the languages of the natives of Kadiak, Unalaska, Kenai, and Sitka.

NOTE.—In the vocabulary of Unalaska the letters *nh*, printed in italics, and *k* and *n*, when final letters, should be half sound only. The inhabitants of this country have this singularity that they pronounce the *th* with the same facility and precisely like the English. The Sitkans observe three tones in every word of length, of which the middle one is the lowest. The language of Kenai is very difficult to be expressed; *k*, with an asterisk preceding it, has a sort of double sound, not unlike the clucking of a hen.

English.	Unalaska.	Kadiak.	Kenai.	Sitka.
A.				
Apple tree				Kootst.
Arrow	Ahathak	Hok	Iz-zeen	Choonet.
Autumn	Sakoodee ki*nh*am	Ooksvoak	Nak-lé	Takooneehaté.
B.				
Bad	Machheedolekan	Aseelnok	Tsooheelta	Sliakooshké.
Bargain	Toomhidada	Youoho		Naoo.
Basket	Ahiahatsak	Haggek	Hakki	Hinahkakaakee.
Basin	Kalukak	Aludak		Tseek.
Bath		Maggeyveek	Nallee.	
Bathe yourself	Keecheecheeda	Hohé		Etashooch.
Bay, the	Oodok	Kanhiak	Botnoo	Key.
Bear	Tanhak	Pagoona	Hank-ta	Hoots.
Beat	Toovvada	Ahtoho	Neelchah	Chok.
Believe	Looceda	Ookheekeeu		Klehakek avaheen.
Belly	Sanhoon	Akcehka	Schboot	Kayu.
Berry		Keeoolhet	Kakká	Knatagget.
Birch tree		Kadzouleek	Tshoo*kia	Attaggé.
Black	Kahchehzeek	Toonhoohalee	Taltashé	Toochaheté.
Blackberry	Ooneehnok	Tshoovavak	Kaantsa	Kanettá.
Bladder	San*h*ook	Keelmak	*Kbis	Athooktee.
Block of wood	Yahamkaka	Kobohak	Keyheytsakh	Shaak.
Blood	Amak	Aook	Kootaalthin.	
Board	Aleiok	Alcku	Opitgaalé	Ta.
Boots	Oleeheek	Peenadeek	Sestlia	Hvon.
Bow	Saeheek		Tsalthan	Saks.
Boy	Anektok	Tanohak	Ts*kanik-na	Hattakoo.
Bracelets	Tameek	Talik vahhat		Chicatooh.
Bragger, a	Adaluke	Sahkvatoolee	Htahootetnash	Hatektsaátee.
Brave	Ehatooleekan	Chak fiak	Astsa*kan	Hikaaká.
Brother	Aheetoken		Kallá	Ahhonoh.
Brother, eldest	Luthan	Angaha.		
Brother, youngest	Keen*h*een	Oouaga.		
Burn		Kvahkaho	Teenhkluté	Kaheekan.
Bush		Iliahenot	Kankya.	
Buy	Akeeda	Youoho		Hanasliahoon.
C.				
Canoe	Ek-yak	Palayak	Ktsekooa	Yakoo.
Cap	Chahoodak	Shaliohnok	Stcheekeetsá	Saahva.
Catch	Sooda		Inlhkit	Alshit.
Cheat	Adaltceda	Eklunváho		Kooltoochiheneska.
Cheek	Oolloohak	Taholskok	Shinkoosha	Kavvosh.

Vocabulary of languages, &c.—Continued.

English.	Unalaska.	Kadiak.	Kenai.	Sitka.
Child		Oodzveelhak	Shareehkahan	Tookonahee.
Chin	Inlakoon	Tamelok	Shtoonee	Kakatatsahí.
Come here	Athemeenahkada	Tykeena maoot	Oontsa	Atkoon kehekoot.
Copper	Kannooyak	Kanooya	Choochoona	Esk.
Cough		Kooek	Khas	Iskohok.
Coward	Ehatoolik	Mamoo keelnok	Chaitsk	Kootliahitchan.
Cry	Kithada	Keya	Nchah	Kaah.
Cure	Oohaeda		Shtatnooliah	Ootoohanakoo.
Cut, a	Teenoonhaseeteé	Kiléhtok	Hootnaanltoo.	
Cut down	Toohoda	Chaggidzu	Kitsalg	At-hoot.
D.				
Dance	Aiuhahada	Seelga		Atieh.
Darkness	Kahihakaiuleek	Tamleek	Heelhaklé	Kaoocheekeet.
Day	Anneliak	Ahanok	Chaan.	
Day, to	Vanaeeneliak	Aganahvák	Chaan	Ittat.
Devil	Ahlikay	Yack	Tskannash	Taeekiekaoo.
Die		Togoo	Cheennah	Eenena.
Dig	A*n*hooheda	Hahoo	Kookeelia	Ekahek.
Dog	Aykok	Piuhta		Kekle.
Door	Aheelrek	Ommeek	Tooka*k	Voldt-haak.
Down, lay it	I*n*hanoon ahada	Ley hue	Neeneeltalh	Chavveke.
Drink	Idhootsiá	Tanha	*Keet-noo	Itanná.
Drown		Keeten	Tgataalnan	Ootahoo.
Dry	Keechheeda	Keenhtsiaho	Nooletsooh	Kahook.
Ducks	Sakeedak	Saholheet	Tinaaltga	Kaoohoo.
E.				
Eagle	Tehlok	Koomaheak	Youkh	Chyak.
Ear	Tootoosak	Chiune	Stseel-oo	Kakook.
Ear-rings	Neetokák	Akhleetot	Stsakeel-a	Ahkookootlee.
Ears	Tootoosakeen	Chiudok	Noolteehastseel-oo.	
Earth	Chekeke	Nooná	Alshnan	Sleenkeetaanee.
Eat	Kada	Peedoho	*Keeoolh	Hha.
Ebb	Agook	Keendok		Hinnahlene.
Eggs	Samlokamnaholik	Manneet		Kvoto.
Ermine		Ameetadook	Kaholgena	Taa.
Evening	Anneliak Ki*n*han	Akfoak	Haalts	Hanna.
Eye	Thak	Inhalak	Shnash-a.	
Eyebrows	Kamteenchnáneen	Kablute	Sheentook	Kaatsá.
Eyelids	Thankah-senee	Koomoogaenga	Snoutootsa	Kaokahekhoo.
Eyes		Inhaliok	Shnashaika	Kavvák.
F.				
Fall, let	It-heeda	Ihtshu	Nootthilneeh	Nakeek.
Farewell	Ang-an	Hvy-ey	Nootheetoosh	Tekooshkee.
Father	Athak	Adaga	Tookta	Kyeah.
Father, a grand	La-tohen	Abaga	Chata	Ahleelhkoo.
Father-in-law		Chaggiga	Shpatsaa	Ahgoo.
Feather	Samaká	Chooluke		Taoo.
Fever		Oknehvahtok		Kootsiti-iet.
Find	Ilhada	Igoohoo	Neoinlheesh	Akakooshee.
Fingers	At-hooneen	Svaánga	Slutska	Katlek.
Finger, fore	Choohvahoaik	Teekhá		Katlehonee.
Finger, middle	Teeklok	Agoolpaga		Katlehtlen.
Finger, third		Ahanovyaha		Katlackakoo.

Vocabulary of languages, &c.—Continued.

English.	Unalaska.	Kadiak.	Kenai.	Sitka.
Finger, little	Icheelokacheedon	Iggelekogá		Kavoonkachek.
Fire	Keyhnak	Knok	Taaz-ee	Haan.
Flood	Chehdootoóleek	Tooneehtok		Takeenatén.
Flower	Chehogniac	Pateehnet.		
Fool, a	Dahkaheholuke	Oosvilnok		Khleakooshké.
Foot	Keetok	Io-oga		Kahooss.
Footstep	Cheemek	Toomeet		Kahoosieté.
Forehead	Tannyak	Tatka	Sheent-hooboonoo	Kakah.
Fox	Ookcheen	Kabiák	*Kanoolsha	Nakatsé.
Frost	Keychók	Nunhla		Koossaát.
G.				
Gather	Tahseda	Aohkee	Inhtat	Kooteet.
Get up	Ankada	Nanhahtoon	Htaneelcheet	Keetan.
Girl, a young	Aehadok	Aggeahak	*Keisen kooya	Shaact.
Give		Taho	Shla*kanhoot	Ahcheeté.
Give me to drink	Teen taanak chheda	Tanhamook cheeggeedna.	Hashnoosheet-ye	Atevat-heen.
Give me to eat	Teen achhooda	Nakmeek cheeggidna	Hashoolhinda	Ahehatneté.
Go	Icha	Keada	Htsaneeltooh	Kooshté.
Go away	Inahanehooda	Aooha	Tsaneeltoosh	Ahkootsoohoo.
Go, let	Ihneeda	Peedzu		Cheennah.
God	Ahoh	Ahyun	Na*kteltaané	Els.
Good	Mach-heeseleek	Aziglee	Pohallen	Tooaké.
Gown or Parka	Sakeen	Atkook	Shtak-a	Koototst.
Gown made of intestines.	Cheehdan	Kanahluk	Keystah-a	At-hoshtee.
Grass	Keyhak	Booit	*Katshan	Chookván.
Green	Chidhaiok	Choonhahlee	*Kteelt-heen	Neeheenteeahenté
Gull, a sea	Slooka	Kadaiat	Baach	Kekliatee.
Guts	Anhek	Kelut	Shintsika	Kanassí.
H.				
Hail	Tahenem dahskeetoo	Kouhdat	Choochoon kalt*ka	Katetst.
Hair	Imleen	Neoet	Stseahoo	Koshahaoo.
Hand	Chiamh	Taleha	Shcoona	Kacheen.
Head	Kamhek	Naskok	Shangg-e	Ashaggee.
Healthy	Anhahaseehelek	Chacheedok	Pohallen	Klekahluneekoo.
Heart	Kannuheen	Oongooatagá	Sec*ktee	Kateh.
He or she	Ikoon	Ooná	Hhoon	Youta.
High	Kaelik	Kanahtoolee	Treélhnoz	Klyahie kooleeké.
Hill, a small		Poonhok mihlenok	Koonalthishi	Koocha.
Hold your tongue	Toonook Talhada	Nuhneelu	*Ktooteelcheet.	
Hook, a fish	Imhazeen	Sagoliak	Ekshak	Shalhootet.
House, a	Oollon	Naa *or* chekhliok	Youiah	Heat.
How much	Kannahen	Kouhcheen	Toonaalt-hé	Koonsa.
I.				
Iron	Komlyahook	Chyavik	Tayeen	Kayez.
J.				
Just	Adaloohooluke	Eklunolnok		Klekilhyitaek.
K.				
Knee	Cheedheedak	Chiskoohka	Scheesh	Kakeeh.
Knot of a tree	Yahhoomtalee	Avyak	Kzeekna.	
Know, do you not, me	Teen ahkatahkohteen-ee.	Nalsvahpoon haka	Heet a shitneetoo	Hateesekooggé.

Vocabulary of languages, &c.—Continued.

English.	Unalaska.	Kadiak.	Kenai.	Sitka.
L.				
Lake	Hanyak	Nanooak	Ban	Aaká.
Leaf	Yahamoleé	Pelu	*Kat-oon	Kahanee.
Lie, to		Eklu	Heentseet	Hataakeehoon.
Light	Anhalyak	Aggiek	Keetsool	Ooteekaan.
Lion, a sea	Kavooak	Adahluk	Atahhlut	Taan.
Lips	Athek	Hluhká	Ezak	Kahak-a.
Liver	Ahhek	Aeenga	Sezzeet	Kakeykoo.
Live, where do you	Kananhoon akoothin	Nanee-cheet	Ndah tokee-eetgan	Kooksehheté.
Loose	Ihkeecha	Tamaho	Keeliahtoonah	Kotooveeh.
Louse	Keetok	Naaeta	You	Betat.
Low	Kasloken	Achahkeelnok	Tzeelhkats.	
Lungs	Hoomehek	Kamaganok	Stsat-tska	Kakahakoo.
M.				
Man	Tayaho	Shook	Teenná	Chakleyh.
Mat	Sootok	Pehat		Toots.
Moon	Tooheedak	Yaalock	Ne-é	Teess.
Morning	Keelyam	Oonoak		Keskhé.
Morrow, to	Kelliohen	Oonoago	Neelkoonda	Sekanneen.
Moss		O-ot	Naan	Tsikahá.
Mother	Annak	Anaha	Anná	Aklee.
Mother, grand	Kookanh	Maga	Choota	Ahlilhkoo.
Mother-in-law	Satemheen		Sh-o	Ahchaan.
Mountain	Koothook	Poonhok anhlee	Teheylé	Shahata.
Mouth	Aheelrek	Kanok	Shnaan	Kak-e.
Murderer	Aleet-hoozok	Tohodgisnooleé	Cheekilhuhe	Chakooté.
Muscles	Vyhak	Kabeeliot		Haak.
N.				
Nails	Kaahelren	Stoonga	Skanna	Kahakoo.
Neck	Oouk	Ooyakoga		Kasetá.
Needle	Inukak	Meenhon	*Klean*kheen	Taakatel.
Nephew	Omnin	Ootscoga	Shooja	Ahkeelk.
Net, a fish	Koozmahek	Agaloo	Tahveelh.	
Night	Amak	Oonuke	*Kan*k	Taat.
Nose	Anhozin	Keenaga	Tsanalleetga	Kaclu.
Nose, rings for the	Suklook	Mydak	Sneeh-a.	
Nostrils	Anhozin Hookik	Padzifahka	Shneek	Kaslutoo.
O.				
Oar	Ahkadvoozeek	Chaheeyoun	Khaneetsté	Ahhá.
Old	Ollek	Kaneehlak	Keychee	Ooteeshen.
Otter, a river	Aakooya	Aakooya	Tact-him	Kooahta.
Otter, a sea	Cheenatok	Ahná	To*k-es	Youheh.
P.				
Palm of the hand	Chankala	Toomága	Slya*ka	Kachentak.
Pay, to		Nalsyaho	Kiushilhnah	Agakeneenee.
People	Tayahoamnaholeeh	Shoot	Koht-ana	Hsleenkeet.
Pillow	Kanheetak	Aggin	Tset-aazdeen	Shehet.
Pine fir		Anknahaleet	Tspaalla	Aasé.
Plant, to	It-heeda	Lseelahkee		Tankanakoo.
Play, to	Meehkada	Vooamee	Cheenleool	Achkoolhiat.
Poor	Itonasak	Nakhee nahalee	Pa*khool	Slshaan.

Vocabulary of languages, &c.—Continued.

English.	Unalaska.	Kadiak.	Kenai.	Sitka.
Poplar tree		Cheehoo	Esnee	Tokoo.
Porpoise	Alladok	Manhak	Koousheé	Chee-each.
Pregnant	Idmaheleek	Aksaluke	Halkhoon	Hetehahoo.
Q.				
Quick	Ayahohodooleek	Choogalee	Naheylhkeet	Chayoukoo.
Quilt, a bed	Kallooheen	Oolik.		
R.				
Rain	Chehtak	Kedok		Seevva.
Raspberry	Halohnak	Alagnak	Koolhkaha	Kleakoo.
Raven	Kalkahyon	Kalnhak	Cheenshla	Els.
Red	Oolluthak	Kaveeglee	Tahalteley	Haniaheté.
Reindeer	It-hayok *	Toondoo	Patchih	Tavvé.
Rejoice	Kaanooda	Noonaneehsaha	Nookooeelthoonh	Nashook.
Rich	Toohkooleek	Kaskok	Kashkanlan	Antlinkintee.
River	Chéhanok	Kooyk	*Katnoo	Hateen.
Roe of fish	Kamheesoo	Chijoot *or* ahmajoot	Kin	Kaakoo.
Roof	Oolankamoo*n*heen	Padoo	Kan*ka	Hanatané.
Root		Nooggihluke	Chan	Ahhaátee.
Rope	Oomnak	Cavahtsee	*Keelh	Tikh.
Rude	Koosootooleek	Kamanahlee	Tggeeknash.	
S.				
Sack, a		Haggek	Oolks	Koelh.
Sand	Choohok	Kabea	Soohoo	Klue.
Sea	Allaook	Eemák	Noot-hé	Teyké.
Seal, a	Izok	Izuik	Kootsaheyls-é	Tsa.
Sell	Nooahada	Aggeechakue		Ihoon.
Send	Ahkáneeda	Tyskue		Koonaká.
Shoot	Toomheda	Peedeedzue	Teehkat	Atoont.
Sick	Takeehzeek	Knal-ha	Cheennah	Haneekoo.
Sing	Oonuhada	Atoová	Katalyash	Atkashee.
Sister	Oo*n*heen		Ootalla	Ahklyak.
Sit down		Agomee	Neetsoot	Kannoó.
Sky	Innyak	Keliok	Youyan	Haats.
Sleep	Sahada	Kahvá		Nattá.
Slow	Aiahohlokan	Chookalnok	Tsoonaheylkeet	Takeynah.
Slumber		Kavahanee	Neeltseelh	Ahekho.
Snow	Kanneeh	Annué	Ajjah	Kleyt.
Snuff	Ihdooteen	Proshka	Ktoona.	
Soft	Ka*n*ha Heydoloken	Oonelnok		Katlyaheté.
Son-in-law	Naahoon	Neengouga		Ahcchoh.
Spark	Keyhnak Kalmeehzeek.	Kalski	Chatalahi	Heektlya.
Spoon	Tahozek	Alugoon	Spata	Shelh.
Spring	Kaneekeen*h*an	Oobnohkak	Klek	Takooité.
Stars	Stan	Ageke	Sceen	Kootahanahá.
Steal	Chhada	Teegleeha	*Knazzeen	Ataoo.
Step	Keeton Keydhooneen.	Toomeenha		Kakoostak.
Stick	Ayaook	Pekhodák	Tgats	Kaats.
Stone	Koovvanak	Yamak	Kaleekneekee	Té.
Straight	At-hádeehaleek	Nalekeeglee	Tsehalkhé	Klyakavoostiek.
Strong	Kayoutooleek	Tookneelee	Talt-hey	Hleetseen.
Summer	Saakoodak	Kiek	Shaan	Kootaan.

There have never been reindeer upon Unalaska, but they purchase the skins and sinews from the Aliaskans.—DALL.

Vocabulary of languages, &c.—Continued.

English.	Unalaska.	Kadiak.	Kenai.	Sitka.
Sun	Ahhapak	Madzak	Channoo	Kakkaan.
Swim	Hoochihada	Quima	Niba	Echkootetecha
T.				
Tail	Samchehcheheteen-ee*nh*.		Pka	Koohoó.
Take	Suda	Tehoo	Ilhkeet	Shee.
Take away by force	Ilyasuda	Aloodzhu	Ktooshecheet	Ashtseet-henesnee.
Tear	Oo*nh*áseda	Chaktaho	Chaanhklut	Astcheetoot-hoot.
Teeth	Kealioozeen	Hoodeit	Shreek-ha	Kaooh.
That		Ooná	Keenee	Eta.
That is mine	Vaya-myou*nh*	Hvy pigá	Shish-iti.	
That is yours	Inne-yemayou*nh*	Hvy lspitpin	Non-iti.	
Thief	Chhaaheleek	Toogluna galee	*Kaneesh	Ataootsaté.
Thin	Annatoolookan	Ameelnok	Trelteet	Klyahiekoossá.
Thread made of the intestines of the whale.	Ihachahsyak	Keepak	Kattsah	Tehkatassé.
Throw	Anooséda	Idzhoo	Yatsteeltuh.	
Thumb	Hooták	Kamlugá	Slukts	Kaakoosh.
Tongue	Ahnak	Oolue	Stseelue	Katnoot.
Touch, do not	Anehtaganan	Chagnilu	Tgaa.	
Touch me, do not	Teen anehtahanok	Chahin-nilnha	Ltoosilhan	Henkatetsen.
Tree	Yahak	Kobohak tsbalakua	Tsbalacooya	Shaak.
U.				
Urchins, sea	Ahoknok	Ootoot		Neets.
V.				
Valley	Chanhanak	Maak		Shecheekeeka.
Vein	Ya-meekhap	Noogak	Tsah	Tass.
Venereal		Idoonak	Tsooeestat	Katluke.
Volcano	Kiehozim Keegnáhee.	Inhyak	Tokoge-hnoohalley.	
W.				
Walk		Quinhdeen	*Kanoontoosh	Haacacoo.
Wash	Cheeohoda	Ohtokó	Tnoonleah	Naootst.
Water	Tanak	Tanak	Veelhneé	Ieen.
Weak	Kauhaleeken	Tookneelnok	*Ktakhooleen	Klekhleetseen.
Wet	Chahtakohalik	Moodzok		Ooteekek.
Whale	Allok	Agvok		Yaaga.
What		Chashtoon	Tsatoo	Vasaet.
What are you afraid of	Alkok Ehagteleetheen.	Chay aleeksiu	Tsatsaeentsk.	
What is your name		Namathoon	Nteeneegee	Coosisaggé.
Where are you going	Kananoomeen	Natmen ayouit	Ndah teenue	Kootéseheenakeoh.
Where were you	Kanaliok Teleetheen	Nahin pudin	Ndah toozitoo	Kooteseheekooteen.
White	Oommeleek	Katogalee	Talkaé	Kletyaheté.
Why	Alkomeen	Chalooden	Tsatskoo	Takotkaasa.
Wide	Slakseek	Ayanahtooleé	Trelt-han	Klyakié-koohoo.
Wind	Kycheek	Kyaeek	Kakneeoon	Keelhcha.
Winter	Kanák	Ookseeok	Hhee	Taakoo.
Wipe	Kidhooda	Alshue	Knin*kash.	
Wise	Akamkahek	Oodzveetoolee	Heet-aneezzan	Hakootseké.
Wizard	Koohok	Tonanok	Chaanchoo	Eht.
Woman	Anhahenak	Aganák	Mokelan	Shavvot.

Vocabulary of languages, &c.—Continued.

English.	Unalaska.	Kadiak.	Kenai.	Sitka.
Work	Avvada	Chená	Heetnoo	Echenené.
Wound		Keoye	Skoo*kha	Eeyeté.
Y.				
Year	Elok	Cheeoolek	Shantto.	
Yellow	Madelohnok	Choonhahlee	Taltsahé	Kandgeheenyahenté
Young	Soohonazak	Soonhak	Kooteehazalheen	Isvat.
Numerals.				
1	Atoken	Ataoodzek	Tseelgtan	Klek.
2	Arlok	Azlha	Nootna	Teh.
3	Kankoo	Peengasvak	Too*k-e	Notsk.
4	Seecheen	Stameek	Tan*k-e	Tackoon.
5	Chaan	Taleemeek	Tskeel-oo	Keecheen.
6	Atoon	Ahoi-lune	*Koojtonee	Ketooshoo.
7	Oolloon	Malehenheen	Kants-e-hé	Tahatoushoo.
8	Kancheen	Inglulun	Ltakool-e	Neetskatooshoo.
9	Seecheen	Koolnhooen	Lkeetseet-hoo	Kooshak.
10	Atek	Koolen	*Klujoon	Cheenkaat.
11	Ateem atoken seehnohta.	Athahtok		Cheenkaat avanhak klek.
12	Ateem arlok seehnota.	Malhognook		Cheenkaat avanhak teh.
13	Ateem kankoo seehnota.	Pinga-you-nook		Cheenkaat avanhak notsk.
14	Ateem secheen seehnohta.	Stamanook		Cheenkaat avanhak tackoon.
15	Ateem chaan seehnohta.	Talee manook		Cheenkaat avanhak keecheen.
16	Ateem atoon seehnota.	Ahoyelooggenook		Cheenkaat avanhak ketooshoo.
17	Ateem oolloon seehnohta.	Mals-honheenook		Cheenkaat avanhak tahatoushoo.
18	Ateem kancheen seehnohta.	Inglu lugnook		Cheenkaat avanhak neetskatooshoo.
19	Ateem secheen seehnohta.	Kooln hooyanook		Cheenkaat avanhak kooshak.
20	Alhatiah	Koolnook or svinák	Tsilhatna	Klek-ka.
30	Kankoodem atek	Sveenák koolnook azluke.	Toot klujoon.	
40	Seecheedem atek	Sveenák mallok	Tange klujoon.	
50	Chaanheedeem atek	Sveenák mallok koolnook pin ha youlook.	Tskil-oo klujoon.	
60	Atoonhidim atek	Sveenet pinhaion	Koojts klujoon.	
70	Oolloonheedeem atek.	Sveenet pinhaion koolnook.	Kankehoh klujoon.	
80	Kancheenheedeen atek.	Sveenet staman.		
90	Seecheenheedeem atek.	Sveenet staman koolnook.		
100	Seesak	Sveenet taleémaloot	Tgastlun.	
200	Alhim seesak	Sveenet kooleen.		

METEOROLOGICAL ABSTRACT FOR SITKA, FROM

Rain and melted snowfall at Sitka, in inches, with the number of

Year.		January.	February.	March.	April.	May.	June.
1847*	Rain	No record.				2. 20	2. 50
	Snow	No record.				0	0
	Rainy days	No record.				(a) 13	19
1848*	Rain	7. 75	1. 30	1. 60	7. 15	8. 40	2. 15
	Snow	1. 00	4. 50	2. 95	1. 55	0	0
	Rainy days	18	19	20	17	(b) 12	(b) 13
1849†	Rain	0. 50	4. 15	0. 05	No record.	No record.	2. 09
	Snow	0. 95	3. 80	4. 85	No record.	No record.	0
	Rainy days	(b) 5	(b) 9	(b) 16	(b) No rec'rd	(b) No rec'rd	20
1850†	Rain	0. 101	7. 732	0. 652	3. 628	3. 715	9. 798
	Snow	3. 420	3. 567	1. 455	3. 016	0	0
	Rainy days	18	24	16	19	23	23
1851†	Rain	6. 239	4. 649	4. 486	4. 042	1. 577	5. 336
	Snow	1. 852	2. 553	1. 185	0. 201	0	0
	Rainy days	20	21	19	14	14	20
1852†	Rain	11. 234	5. 168	3. 420	2. 244	4. 719	(c) 2. 630
	Snow	0. 148	2. 683	1. 120	0. 920	0	0
	Rainy days	27	21	13	18	20	22
1853†	Rain and snow	15. 028	4. 055	3. 610	3. 100	5. 079	6. 164
	Rainy days	30	15	21	13	19	20
1854†	Rain and snow	2. 504	6. 289	10. 091	3. 395	7. 812	4. 478
	Rainy days	15	22	23	27	27	22
1856†	Rain	4. 438	12. 508	6. 047	5. 451	2. 793	5. 080
	Snow	0	0. 056	0. 551	1. 250	0	0
	Rainy days	24	21	23	30	21	22
1857*	Rain	0. 638	0. 000	1. 023	6. 562	2. 600	5. 795
	Snow	2. 480	2. 035	1. 048	0	0	0
	Rainy days	16	12	14	23	21	26
1858*	Rain and snow	8. 807	4. 223	8. 794	4. 465	1. 306	3. 781
	Rainy days	24	17	25	21	15	21
1859*	Rain	15. 275	4. 490	3. 135	6. 140	5. 793	2. 525
	Snow	0. 695	0	0. 630	0	0	0
	Rainy days	25	11	16	20	25	16
1860*	Rain	11. 885	11. 130	2. 920	5. 095	2. 220	No record.
	Snow	1. 085	2. 670	1. 580	0. 500	(c)	No record.
	Rainy days	24	22	21	21	12	17
1861*	Rain	7. 129	5. 455	4. 230	3. 395	1. 550	0. 901
	Snow	1. 259	0. 275	0 hf. mo.	Clear. 0	0	0
	Rainy days	16	21	16	17	12	8
1862*	Rain	0. 800	4. 820	0. 789	2. 044	4. 926	2. 492
	Snow	1. 790	0. 998	1. 485	1. 058	0. 622	0
	Rainy days	15	16	19	20	15	13
Totals		107. 007	99. 106	67. 701	62. 206	55. 312	55. 720
Monthly mean rainfall		7. 643	7. 079	4. 836	5. 016	4. 142	4. 038
Mean rainy days		20	18	19	18	18	22

(a) A clear month. (b) No record of the hours upon which rain or snow fell. (c) Only twenty-
(f) For seven and one-third months. (g) For eight months. * Observations every hour.

1847 TO 1862, LATITUDE 57° 02′.5, LONGITUDE 135° 18′.2.

days upon which rain, snow, or hail fell, or when thick fog prevailed.

July.	August.	September.	October.	November.	December.	Total inches.	Yearly rain and snow.	Total rainy days.
2. 80	3. 25	10. 00	8. 65	5. 45	4. 95	39. 80		
0	0	0	0	1. 41	3. 20	4. 61	(*g*) 44. 41	
17	17	23	23	25	26	.....	.....	(*g*) 163
0. 90	8. 55	12. 50	12. 55	11. 70	1. 95	76. 80		
0	0	0	0	0	4. 45	14. 45	91. 25	
(*b*) 7	(*b*) 17	(*b*) 22	(*b*) 24	(*b*) 22	(*b*) 15	.....	.....	207
4. 16	9. 808	14. 327	11. 119	4. 657	2. 469	53. 332		
0	0	0	0. 288	0. 976	1. 115	11. 979	65. 311	
24	27	26	25	19	18	.....	.....	189
3. 143	10. 310	15. 226	14. 067	9. 336	5. 593	83. 301		
0	0	0	0	0. 745	0. 294	12. 497	95. 808	
13	22	23	27	24	20	.....	.....	252
4. 673	2. 684	2. 434	13. 778	8. 099	8. 059	66. 056		
0	0	0	0	0. 294	0. 314	6. 399	72. 455	
20	16	13	24	27	13	.....	.....	222
1. 891	8. 543	12. 615	12. 503	5. 119	0. 537	70. 623		
0	0	0	0	0. 492	1. 177	6. 540	(*d*) 77. 163	
17	23	22	24	21	9	.....	.....	(*d*) 232
4. 124	7. 181	6. 735	19. 527	0. 451	15. 883	90. 934	90. 934	
22	20	19	26	Cl'r. mo. 6	28	.....	.....	237
4. 895	3. 969	8. 417	11. 550	14. 712	9. 059	87. 171	87. 171	
22	22	20	23	30	21	.....	.....	247
8. 114	3. 071	12. 727	11. 140	7. 378	5. 079	83. 826		
0	0	0	0	0. 399	1. 432	3. 688	87. 514	
23	23	30	26	23	16	.....	.....	285
10. 889	6. 441	8. 076	9. 858	12. 696	14. 815	79. 393		
0	0	0	0	0	2. 463	8. 026	87. 419	
29	20	21	24	21	26	.....	.....	253
5. 195	5. 790	7. 861	9. 186	14. 245	8. 120	81. 776	81. 776	
18	21	21	28	26	17	.....	.....	254
2. 335	13. 405	9. 145	6. 830	2. 825	8. 860	80. 758		
0	0	0	0. 135	0. 110	0. 045	1. 615	82. 373	
21	24	21	24	10	24	.....	.....	237
No record.	11. 663	14. 545	9. 750	No record.	No record.	69. 208		
No record.	0	0	0	No record.	No record.	5. 835	(*f*) 75. 043	
9	25	18	24	18	Cl'r. mo. 7	.....	.....	218
2. 715	6. 350	6. 119	13. 075	4. 665	All snow.	55. 572		
0	0	0	0	0. 990	2. 572	5. 096	60. 668	
19	15	21	24	17	16	.....	.....	202
1. 504	8. 144	15. 924	14. 021	12. 039	10. 967	78. 474		
0	0	0	0	0	1. 522	7. 475	85. 949	
14	23	25	20	24	28	.....	.....	232
57. 340	109. 159	156. 951	178. 025	118. 788	114. 925	Average for	14. 09 years.	
4. 103	7. 277	10. 461	11. 868	8. 485	8. 209	83. 33	inches.	Average.
21	23	23	26	23	19	.....	.....	245

four day's observations. (*d*) Eleven and four-fifths months. (*e*) No record after the 10th.
† Observations from 4 h. to 20 h.

Barometer at Sitka, in inches, from 1849 *to* 1862.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly mean.	Pressure of the dry air.	Mean of 3 obs., 6 a. m., 2 and 10 p. m.	Pressure of dry air.
1862*	29.931	29.902	29.664	29.854	29.965	29.908	29.930	29.906	29.828	29.850	29.862	29.618	29.852	29.630		
1861*	29.695	29.507	29.790	29.634	29.871	29.854	29.830	29.938	29.814	29.729	29.564	29.640	29.739	29.494		
1860*	29.582	29.639	29.618	29.775	29.900	30.022	29.920	29.854	29.834	29.626	29.642	29.806	29.768	29.516		
1859*	29.660	29.510	29.489	29.929	29.852	29.822	29.897	29.910	29.735	29.656	29.800	29.792	29.754	29.518		
1858*	29.860	29.828	29.932	29.691	29.877	29.887	29.988	29.882	29.866	29.602	29.563	29.478	29.702	29.462		
1857*	29.786	29.705	29.735	30.012	29.878	29.742	29.930	29.842	29.750	29.664	29.741	29.428	29.764	29.560		
1856†	29.644	29.831	29.870	29.556	29.885	29.855	29.932	29.990	29.768	29.710	29.718	29.688	29.788	29.529		
1854†	29.998	29.676	29.852	29.690	30.018	29.780	30.108	29.900	29.846	29.850	29.580	29.684	29.878	29.582	29.828	29.584
1853†	29.388	29.830	29.878	29.926	29.938	29.938	30.020	29.992	29.862	29.606	‡29.812	29.602	29.816	.....	29.816	
1852†	29.794	29.882	29.898	29.600	29.967	29.980	29.972	29.906	29.988	29.640	29.744	29.864	29.846	29.594	29.844	29.600
1851†	29.580	29.538	29.844	30.087	30.048	30.053	30.016	30.060	30.054	29.772	29.778	29.888	29.918	29.658	29.917	29.612
1850§	29.630	29.686	29.758	30.106	29.991	29.892	30.036	29.954	29.931	29.678	29.484	29.862	29.830	29.590		
Means	29.712	29.784	29.844	29.822	29.932	29.894	29.965	29.928	29.856	29.699	29.691	29.696	29.721	29.603		

* Observations hourly.

† Means of seventeen observations each day at 6 a. m. to 10 p. m., inclusive.

‡ A remarkably clear month, with continuous winds from the northeast, (true.)

§ The means are formed from the daily means derived from the three observations each day, at 6 a. m., 2, and 10 p. m.

Thermometer at Sitka, 1849–1862, (*Fahrenheit.*)

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly means.	Mean of the minima from the observations.	Mean of the maxima from the observations.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
1862*	25.1	26.8	34.9	36.5	42.8	50.5	55.8	54.9	48.2	41.2	41.0	36.7	41.2		
1861*	31.8	37.0	37.4	41.4	47.5	54.0	56.7	56.7	54.0	44.4	34.2	23.2	43.2	28.7	57.2
1860*	34.7	34.5	37.3	39.4	46.6	51.6	58.3	56.1	51.8	46.0	41.6	29.5	43.9		
1859*	33.1	27.5	34.7	40.6	46.0	52.7	54.3	54.1	51.4	40.1	28.8	37.3	41.4	37.0	46.6
1858*	23.4	28.2	37.3	41.0	47.1	51.8	54.7	54.5	50.4	43.7	40.0	28.0	41.9	37.2	47.1
1857*	29.1	29.3	37.2	43.6	48.7	52.0	54.5	55.9	50.9	46.1	41.7	37.0	43.7		
1856†	37.8	39.2	41.0	44.0	49.6	52.0	52.9	55.4	51.4	43.0	39.0	31.3	44.4	40.0	48.3
1854†	28.6	32.7	33.6	42.3	45.8	51.1	54.7	56.7	51.8	43.0	43.2	33.7	42.9	‡41.9	
1853†	33.2	36.3	36.5	42.1	48.9	50.0	53.4	53.9	51.1	43.2	§19.9	34.9	41.9	40.8	
1852†	39.7	33.8	32.1	41.9	47.5	52.0	57.4	56.8	52.7	46.4	35.6	24.4	43.2	42.4	47.5
1851†	30.0	34.7	37.6	43.7	50.2	53.2	56.5	58.8	52.5	48.9	41.9	29.1	45.8	43.5	49.3
1850†	21.9	34.9	26.7	38.4	45.5	49.9	54.5	55.6	50.0	44.2	39.0	36.0	41.4	‖36.3	46.7
Means	31.1	32.9	35.5	41.2	47.2	51.7	55.3	55.8	51.3	44.2	37.1	31.7	42.9	38.6	48.9

* Observations hourly.

† Means of seventeen observations each day, at 6 a. m. to 10 p. m., inclusive.

‡ Daily means from three observations.

§ The means are formed from the daily means derived from the three observations each day, at 6 a. m., 2, and 10 p. m.

‖ Minimum for three observations.

Force of aqueous vapor at Sitka—1849–1862.

Year.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Yearly means.	
	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$	e''	$\frac{e''}{e}$
	Inch.	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*	*Inch.*
1862*	.123	.086	.139	.081	.148	.073	.150	.068	.203	.075	.277	.076	.347	.079	.349	.082	.286	.085	.224	.085	.212	.082	.188	.085	.221.	080
1861*	.158	.086	.178	.081	.180	.081	.200	.078	.249	.076	.323	.078	.368	.082	.382	.085	.365	.088	.257	.088	.165	.081	.112	.083	.245	.082
1860*	.187	.090	.180	.088	.170	.080	.191	.076	.242	.077	.312	.084	.394	.082	.395	.090	.317	.084	.271	.093	.222	.085	.157	.085	.253	.085
1859*	.176	.090	.135	.086	.161	.081	.204	.082	.238	.081	.294	.077	.361	.087	.379	.092	.342	.091	.211	.083	.135	.081	.196	.090	.236	.085
1858*	.146	.090	.140	.083	.184	.086	.204	.081	.255	.080	.312	.083	.368	.087	.369	.089	.310	.088	.239	.084	.217	.088	.142	.089	.242	.086
1857*	.135	.080	.137	.083	.170	.077	.233	.083	.277	.080	.318	.083	.378	.091	.374	.086	.318	.086	.266	.090	.235	.089	.198	.090	.253	.085
1856†	.197	.084	.212	.088	.225	.088	.209	.083	.274	.078	.311	.081	.341	.087	.375	.088	.337	.090	.238	.086	.214	.089	.161	.087	.258	.086
1854†	.140	.087	.171	.090	.159	.081	.205	.077	.248	.084	.302	.083	.354	.084	.379	.086	.331	.087	.241	.086	.246	.089	.184	.087	.246	.085
1852†	.211	.087	.176	.087	.134	.073	.192	.079	.261	.084	.299	.083	.369	.085	.393	.092	.436	.091	.277	.091	.180	.087	.113	.080	.250	.083
1851†	.155	.086	.184	.091	.186	.082	.201	.072	.275	.077	.325	.082	.378	.084	.410	.084	.335	.086	.288	.084	.228	.086	.137	.088	.260	.084
1850‡	.108	.085	.180	.088	.128	.078	.194	.086	.244	.082	.296	.087	.362	.086	.393	.090	.330	.092	.255	.089	.201	.085	.189	.089	.240	.084
Means	.158	.086	.167	.086	.168	.080	.198	.079	.251	.079	.306	.082	.365	.087	.382	.088	.328	.088	.252	.087	.205	.086	.162	.087	.247	.084

NOTE.—e'' expresses the force of aqueous vapor existing in the air, and e that which would exist if the air was saturated.

* Observations hourly.

† Means of seventeen observations each day at 6 a. m. to 10 p. m. inclusive.

‡ The means are formed from the daily means derived from the three each day at 6 a. m., 2 and 10 p. m.

**Daily meteorological record at Sitka, Alaska, from May 1 to September 29, 1867.*

Date.	Barometer in inches, reduced to 62° Fahr.	Thermometer, Fahrenheit.					Rain in inches.	Wind.	Sky clear in tenths.
		Dry.	Wet.	Highest observed.	Lowest observed.	Black bulb exposed at noon.			
1867.		°	°	°	°	°			
May 1	29.586	46.19	43.11	50.6	41.9	59.7	.065	E., NE., NW	0
2	29.702	43.45	41.71	49.6	38.7	.....	.275	SW., W., E	0
3	29.926	43.13	40.75	49.4	33.8	.....	.050	SW., NE., E	5
4	29.511	45.80	41.43	47.3	43.0	.....	.035	E., NE., SE	0
5	29.547	42.35	40.32	45.9	40.1	.....	.450	S., SE., E	0
6	29.717	43.58	42.89	50.3	37.4	.....	.040	SE., NE., NW	1
7	29.970	46.71	43.25	53.4	33.8	71.5	.....	SW., NW., NE	9
8	30.135	46.40	41.74	52.2	38.5	67.5	.....	W., NW	5
9	30.228	43.29	40.77	47.5	38.7	67.5	.210	SW., NW., NE	0
10	30.255	43.90	42.05	47.7	38.7	.....	.025	SW., NE	1
11	30.239	44.73	42.64	50.0	38.7	59.0	.040	SW., SE., NE	2
12	29.997	47.02	46.42	54.5	36.5	74.7	.....	SW., NE	10
13	29.930	51.37	47.00	58.1	42.8	67.0	.....	SW., NE	3
14	29.880	52.96	47.99	60.1	42.8	88.6	.....	SW	3
15	30.004	50.29	46.98	55.6	42.1	73.6	.....	S., W	2
16	30.083	49.44	46.23	53.6	40.1	76.0	.....	W	5
17	29.976	54.41	50.35	60.3	46.0	81.5	.....	S., N	10
18	29.943	58.77	51.82	68.2	46.4	101.3	.....	SW., variable	9
19	29.885	56.59	51.03	64.8	50.1	101.7	.....	Variable	4
20	29.901	50.90	47.18	55.4	41.0	67.5	.....	S., NE	7
21	29.756	54.14	50.68	58.6	47.7	87.6	.....	S., E., W., variable	5
22	29.769	52.81	49.76	60.1	45.5	.....	.....	E., NW	3
23	29.600	55.96	50.62	62.6	50.1	75.0	.....	NE., NW	3
24	29.709	49.53	45.83	52.7	43.7	.....	.190	Calm	0
25	29.788	49.38	46.04	52.9	44.6	.....	.015	Calm	0
26	29.775	45.85	43.88	50.9	40.8	.....	.665	SW., NE., E	0
27	29.910	46.44	44.15	50.4	42.8	.....	.160	S., SW., E	0
28	29.988	48.22	45.86	51.8	44.1	.....	.290	SW., NE., E	2
29	29.915	49.61	46.24	51.8	46.4	.....	.025	SE	0
30	29.880	46.16	43.26	50.1	43.2	.....	.590	SE	0
31	29.921	46.85	43.23	48.2	41.0	.....	.320	Variable, calm	0
Means ...	29.949	48.59	45.56	.....	.....	.....	3.445		
June 1	29.893	47.03	44.41	52.2	36.5	.....	.....	Variable, calm	5
2	29.888	49.98	45.63	54.9	42.8	83.7	.025	SW., W., NW	2
3	29.859	49.96	46.60	54.7	44.6	76.6	.030	SSW., W., NW	2
4	29.818	47.56	43.36	51.3	42.3	56.3	.175	SW., N., NE	0
5	30.025	47.39	45.98	50.9	44.4	.....	.005	NW., N., NE., E	0
6	30.049	50.66	45.99	52.2	44.6	62.6	.....	Calm, NE., E	0
7	29.888	50.43	45.95	52.0	47.3	.....	.160	E., S	0
8	29.988	50.41	46.71	52.5	46.2	.....	.290	E., S	0
9	29.951	49.53	46.87	52.7	43.9	.....	.220	Variable, calm	0
10	29.956	50.26	46.98	53.6	46.3	.....	.070	SW., E., NW	0
11	29.947	49.94	46.24	52.5	46.0	.....	.....	NW., W	0
12	30.065	51.53	50.12	54.9	45.5	69.8	.....	SW., S., calm	1
13	30.159	51.33	49.81	55.4	41.7	62.1	.....	SW., NE	5
14	30.067	54.23	50.99	60.8	45.5	86.0	.....	S., W., SW	8
15	29.928	54.81	51.48	59.2	43.5	86.0	.....	S., W., calm	10

* Observations made for sixteen hours daily.

Daily meteorological record at Sitka, Alaska—Continued.

Date.	Barometer in inches, reduced to 62° Fahr.	Thermometer, Fahrenheit.					Rain in inches.	Wind.	Sky clear in tenths.
		Dry.	Wet.	Highest observed.	Lowest observed.	Black bulb exposed at noon.			
1867.		°	°	°	°	°			
June 16	29.857	56.01	52.96	64.0	47.7	90.0	.....	SW., S	4
17	29.861	51.14	50.45	55.2	46.6	.....	.....	SW., calm	0
18	29.772	54.90	52.63	58.6	47.7	81.9	.....	SW., W	9
19	29.800	51.57	50.79	58.3	47.3	82.4	.010	W., S	1
20	29.863	50.22	49.61	52.5	49.6	.....	.....	SW	0
21	29.999	50.43	47.61	52.7	46.6	.....	.015	SW., W., NW	0
22	30.053	52.68	50.19	60.6	43.9	66.2	.....	SW., calm, NW	5
23	29.870	60.14	54.66	64.6	54.5	68.7	.....	SW., calm, NE	3
24	29.833	56.79	53.98	61.7	54.0	83.7	.065	SW., calm, W	0
25	29.629	61.36	56.95	65.0	56.7	68.0	.015	SE., E., NE	0
26	29.688	53.44	51.93	55.9	50.7	.....	.605	NW., W., S	0
27	29.860	55.94	52.29	62.1	50.55	.....	.055	W., SE., NE	6
28	29.960	58.84	54.63	65.0	52.2	99.9	.....	W., calm, SW	1
29	30.000	57.91	54.39	61.2	51.8	83.7	.....	SW., W., NW	7
30	29.891	58.23	54.61	62.8	50.9	86.4	.....	SW., calm	6
Means ...	29.915	52.82	49.83	.....	.....	.....	1.740		
July 1	29.777	58.75	54.95	62.8	53.4	88.7	.....	SW., calm	2
2	29.896	56.54	53.37	59.9	50.5	77.0	.....	SW., variable	3
3	29.979	54.81	52.36	58.5	50.4	.....	.040	W., calm	0
4	30.047	53.86	50.92	57.4	50.0	.....	.010	W., SW	0
5	30.073	52.51	50.18	56.3	49.9	.....	.....	Calm	0
6	30.037	54.76	51.64	59.0	49.4	68.4	.....	SW., W., calm	0
7	29.830	57.08	52.77	61.7	47.7	72.5	.....	SW., calm	2
8	29.672	56.20	52.75	60.3	51.8	69.1	.010	NW., variable	0
9	29.810	53.71	50.31	58.5	50.5	.....	.....	S., NE., variable	0
10	29.692	53.89	51.78	57.0	51.8	.....	.415	NW., SW., calm	0
11	29.735	53.31	51.64	55.8	50.1	.....	.175	SW., calm	0
12	29.827	53.48	51.51	57.2	50.0	60.8	.070	SW., W., calm	0
13	29.827	54.25	51.08	58.5	46.4	.....	.....	SW., NE	2
14	29.683	55.17	51.37	59.2	50.0	59.0	.195	NE	0
15	29.865	57.13	52.32	62.4	47.7	65.7	.....	SW., variable	5
16	29.845	55.44	51.10	60.1	50.0	87.8	.....	SW., NW., E	5
17	29.570	51.70	49.87	54.0	50.3	.....	.240	SE., E., NE	0
18	29.681	54.40	51.30	58.3	50.3	.....	.005	NE., calm, NW	0
19	29.692	55.78	51.16	63.9	45.5	69.8	.....	E., calm	6
20	29.521	58.45	53.89	64.8	46.6	88.4	.....	SW., variable	8
21	29.675	54.42	53.22	60.8	50.4	79.0	.010	SW., S., SE	1
22	29.923	53.44	51.73	56.3	50.9	.....	.....	S., SW., calm	0
23	29.982	56.09	53.71	59.0	52.5	.....	.....	S., NW	0
24	29.909	56.26	54.07	60.8	50.5	77.0	.....	SW., W	1
25	29.831	55.89	53.69	59.0	51.8	.....	.005	SW., S., NW	3
26	29.920	55.04	53.48	57.6	51.6	.....	.....	Variable, calm	0
27	29.896	54.36	52.83	58.3	51.8	.....	.360	SW., calm	0
28	29.865	55.02	55.81	58.5	50.7	63.9	.580	Calm	0
29	29.818	56.99	54.34	60.8	53.8	71.1	.105	E., NW	0
30	29.876	54.76	53.80	56.3	53.4	.....	1.570	Variable	0
31	29.508	52.60	51.35	54.5	48.65	.....	.335	SE. to NW	1
Means ...	29.815	55.02	52.72	.....	.....	.....	4.125		

Daily meteorological record at Sitka, Alaska—Continued.

Date.	Barometer in inches, reduced to 62° Fahr.	Thermometer, Fahrenheit.					Rain in inches.	Wind.	Sky clear in tenths.
		Dry.	Wet.	Highest observed.	Lowest observed.	Black bulb exposed at noon.			
1867.		°	°	°	°	°			
Aug. 1	29.900	52.25	50.00	54.05	49.10	.....	.235	SW., NE., E	1
2	29.722	52.92	49.77	55.17	50.00	.....	.135	E., SE., variable	0
3	29.731	51.80	49.10	55.62	47.97	.....	.155	S., NE., E	0
4	29.752	51.12	49.55	54.50	46.62	.....	.325	SW., NE., variable	2
5	29.775	51.80	49.32	57.65	42.80	.....	.010	Variable	5
6	29.898	52.47	50.90	55.62	49.32	.....	.345	SW., variable	0
7	29.965	51.57	50.45	52.70	50.00	.....	.335	SE., E., NE., variable	0
8	29.827	52.47	51.57	55.85	51.35	.....	.785	S., SE., SW	0
9	29.836	53.60	51.57	57.20	49.77	74.75	.000	SW., calm, NW	1
10	29.848	53.82	52.92	55.40	51.80	.....	.885	Variable, NW., SW	0
11	29.927	53.82	53.60	55.62	52.92	.....	3.630	S., SW., NE., calm	0
12	29.922	53.60	52.25	56.52	50.90	.....	.785	Calm, SW., E., S	0
13	29.768	51.35	50.67	54.05	45.50	.....	.755	S., calm, E., N., W	0
14	29.723	53.15	52.25	54.95	50.40	.....	1.190	Variable	0
15	29.732	50.40	49.32	54.95	47.75	.....	1.395	SW., calm, NE	0
16	29.760	49.77	47.75	53.15	47.07	.....	.310	S., SE., E., NE	1
17	29.567	50.67	48.20	53.37	47.75	.....	.155	E., calm, N	0
18	29.666	51.57	50.67	53.60	48.87	.....	.750	W., S., calm, E., SE	0
19	29.847	51.12	49.55	53.15	48.42	.....	.335	E., SE., NE., calm	0
20	29.743	51.57	50.00	52.93	50.22	.....	.050	S., NE., calm, E., SE	0
21	29.557	51.12	48.87	54.50	47.75	.....	.750	E., SW., SE., E	0
22	29.732	49.10	46.42	51.31	45.95	.....	.270	E., variable	1
23	29.646	49.77	47.30	53.60	47.30	.....	1.335	E., SE., NE	1
24	29.594	46.85	45.95	47.75	45.95	.....	1.740	E., SE., NE	0
25	29.764	49.77	48.65	51.80	46.62	.....	.605	S., SW., SE	2
26	29.898	51.57	50.90	54.05	49.10	.....	1.810	E., SE., NE	0
27	30.007	53.15	52.25	55.40	50.90	.....	.370	E., SW., S., calm	1
28	29.944	55.40	54.95	55.85	51.80	.....	.660	SW., calm, NW	0
29	29.936	54.95	54.50	57.20	52.70	.....	.040	W., calm	0
30	30.064	53.60	53.15	58.55	50.22	.....	.820	SW., calm, W	1
31	30.253	52.02	50.00	56.07	45.95	.....	.....	W., calm	4
Means ...	29.816	51.88	50.33	.....	.....	.....	20.965		
Sept. 1	30.212	52.92	52.02	55.40	50.45	.....	.245	W., calm, NE., NW	0
2	30.116	50.00	45.50	53.15	49.10	.....	.005	Variable	3
3	30.077	48.87	46.85	55.62	42.57	64.80	.....	W., NW., calm, NE	5
4	29.822	46.85	44.60	54.50	40.55	.....	.405	E., NW., NE	4
5	29.954	52.92	46.17	59.45	40.55	79.95	.....	NW., N., calm	9
6	30.034	52.25	48.87	57.87	64.15	93.65	.....	Variable	6
7	30.057	54.27	52.47	55.85	52.92	63.50	.....	SW., calm, SE	0
8	30.080	52.25	51.35	55.85	50.45	.....	.705	E., SW	0
9	30.047	52.25	51.12	59.65	47.07	.....	.....	Variable, W	5
10	29.756	50.90	49.55	53.15	49.10	69.30	.215	SW., calm, variable	1
11	29.497	51.12	49.10	52.70	46.85	.....	1.040	E., NW	0
12	29.538	47.75	46.17	51.12	46.05	.....	.450	E., NE., SE	1
13	29.634	47.97	45.72	51.80	43.25	.....	.....	Variable	4
14	29.712	47.30	45.95	53.15	37.85	.....	.010	SW., NE., NW	5
15	29.918	49.77	46.85	53.60	45.50	72.90	.....	SW., NW., W	3
16	29.880	51.12	49.55	53.60	47.75	.....	1.690	E., SW	0

Daily meteorological record at Sitka, Alaska—Continued.

Date.	Barometer in inches, reduced to 62° Fahr.	Thermometer, Fahrenheit.					Rain in inches.	Wind.	Sky clear in tenths.
		Dry.	Wet.	Highest observed.	Lowest observed.	Black bulb exposed at noon.			
1867.		°	°	°	°	°			
Sept. 17	30.042	50.45	49.10	52.60	47.30	.....	.215	Variable	0
18	29.941	52.47	50.00	57.75	48.20	.....	2.115	E., SE., NE	0
19	29.725	51.12	50.22	59.00	46.17	.....	.760	Variable	0
20	29.613	52.25	50.22	54.50	48.65	.....	1.040	Variable	0
21	29.588	52.70	51.67	54.50	50.45	.....	.410	S., SE	0
22	29.679	49.77	48.65	51.57	46.40	.....	.550	SW., S., E	0
23	29.420	51.12	58.87	54.05	49.35	.....	.470	E., NE., SE	0
24	29.604	51.31	50.45	53.60	46.17	.....	.745	E., NW., calm	1
25	29.866	49.10	48.20	51.80	46.17	.....	3.545	Calm, E., variable	0
26	29.952	49.55	48.87	52.25	46.17	.....	.395	SW., E., calm	1
27	29.972	47.97	47.57	50.90	46.27	.....	.265	E., SE	0
28	29.472	48.20	46.85	50.00	46.85	.....	1.025	E., NW	0
29	29.841	47.07	45.95	52.70	36.95	.....	.....	NW., calm, SW	6
30	.....	.....	.....	.....	.....	.....	.050		
Means of 29 days.	29.793	50.40	48.57	.....	.....	.....	16.350		

For the first eighteen days of October the amount of rain was 7.42 inches; observing then discontinued; heavy weather after that date to the end of the month; hurricane on the 28th.

METEOROLOGICAL OBSERVATIONS AT ILIOULIOUK, UNALASKA, 1825—1834, OLD STYLE. LATITUDE 53° 52′.7, LONGITUDE 166° 29′.1.

Observations of the barometer, reduced to 14° *Reaumur* 63°.5 *Fahrenheit.*

Years.	January.			February.			March.			April.			May.			June.		
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
1825	30.09	28.45	29.041	29.51	28.42	28.983	29.71	28.19	28.958	29.88	29.84	29.242	29.90	28.95	29.416	29.79	28.88	29.364
1826	29.59	28.58	29.030	30.19	29.49	29.588	29.94	28.49	29.243	30.02	28.56	29.219	29.92	29.02	29.498	29.89	29.04	29.491
1827	30.04	28.49	29.218	29.97	28.49	29.279	30.01	28.77	29.320	30.04	28.70	29.414						
1828	29.94	28.77	29.47	29.84	28.35	29.17	30.08	28.72	29.42	29.74	28.98	29.32	30.06	28.94	29.50	29.78	28.96	29.44
1829	29.73	28.36	29.29	28.69	28.55	29.20	29.98	28.51	29.08	29.24	28.44	29.55	30.11	28.80	29.43	29.89	29.05	29.55
1830	29.96	28.97	29.455	30.38	28.87	29.592	30.12	28.93	29.639	30.20	28.75	29.360	30.01	28.92	29.505	29.86	28.87	29.542
1831	30.14	28.26	29.307	30.05	28.27	29.107	30.00	28.15	29.309	30.03	28.66	29.501	29.90	28.90	29.559	30.10	29.13	29.642
1832	30.22	29.03	29.743	30.25	29.07	29.697	30.11	29.28	29.778	29.97	28.98	29.533	29.85	29.04	29.500	29.89	29.23	29.604
1833	29.59	28.40	29.030	30.08	28.67	29.246	30.06	28.50	29.302	30.11	28.60	29.573	29.80	29.17	29.518			
1834	30.26	28.90	29.579	30.39	28.49	29.599	30.26	29.17	29.860	29.99	28.79	29.499	30.00	29.44	29.713	29.99	29.07	29.528
Means	29.96	28.90	29.317	30.03	28.66	29.341	30.03	28.57	29.416	30.02	28.73	29.429	29.95	29.02	29.464	29.89	29.04	29.520
Highest and lowest of each month	30.26	28.26	.....	30.39	28.27	.....	30.26	28.15	.....	30.24	28.44	.....	30.11	28.80	.....	30.10	28.87	

The mean of all the above observations, nine full years, is 29.421 inches. The highest observed reading in the above time was 30.39 inches, and the lowest 28.05 inches.

Observations of the barometer at Ilioulíouk, Unalaska—Continued.

Years.	July.			August.			September.			October.			November.			December.			Yearly means.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	
1825	29.81	28.98	29.501	29.86	28.75	29.400	29.84	28.74	29.400	29.87	28.17	29.202	29.76	28.31	29.065	.....	.....	.....	29.299*
1826	29.78	28.99	29.447	29.85	29.21	29.551	29.64	28.41	29.100	29.79	28.15	29.105	29.70	28.07	28.991	30.14	28.56	29.553	29.318
1827	.....	.....	.....	.....	.....	.....	.....	.....	.....	29.85	29.01	29.23	30.08	28.60	29.44	30.26	28.87	29.65	29.373†
1828	29.89	29.18	29.56	30.00	29.20	29.65	29.77	28.74	29.41	29.82	28.45	29.16	29.85	28.66	29.20	30.38	28.71	29.83	29.43
1829	29.78	29.19	29.578	30.22	29.09	29.519	29.79	28.50	29.161	30.05	28.87	29.521	30.31	28.57	29.669	30.23	28.88	29.709	29.438
1830	30.03	29.04	29.653	29.87	28.95	29.457	30.15	28.54	29.402	30.05	28.94	29.518	29.93	28.05	29.076	29.92	28.07	29.328	29.460
1831	30.04	29.13	29.571	29.93	29.02	29.493	30.06	28.95	29.176	30.04	28.59	29.586	29.91	28.21	29.542	29.55	28.11	28.892	29.397
1832	30.05	29.05	29.685	29.95	29.00	29.511	29.89	28.90	29.538	30.01	28.45	29.536	29.82	28.46	29.214	30.32	28.64	29.428	29.572
1833	30.00	29.16	29.712	30.04	29.11	29.611	29.82	28.49	29.259	29.65	28.51	29.019	29.63	28.65	29.388	30.22	28.07	29.392	29.368
1834	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29.629‡
Means	29.91	29.09	29.588	29.97	29.04	29.537	29.87	28.66	29.307	29.90	28.57	29.319	29.88	28.39	29.287	30.13	28.57	29.475	
Highest and lowest of each month.	30.05	28.98	.....	30.22	28.75	.....	30.15	28.41	.....	30.05	28.15	.....	30.31	28.05	.....	30.38	28.07		

NOTE.—The barometer by which the above observations were made is marked Benjamin 94 XV, and was compared in 1827 with the barometer of the discovery vessel Seniavin under ——, and found to read 0.32 inch lower; therefore all these observations must be increased by that amount.

* Mean for eleven months.

† Mean for seven months.

‡ Mean for six months.

METEOROLOGICAL OBSERVATIONS AT ILIOULIOUK, UNALASKA, 1827–1834.

Temperature observations, from 1828 to 1834, old style.

Year.	January.						February.						March.					
	A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Max.	Min.
					Max.	Min.					Max.	Min.						
1828				40.3						32.8						31.8		
1829				28.6						31.1						32.2		
1830	20.5	23.8	19.8	21.30	39.9	2.7	26.1	33.0	26.1	28.4	44.4	—0.6	17.1	24.8	17.9	19.9	45.5	0.5
1831	28.2	30.5	28.1	28.93	41.0	9.5	26.8	29.4	26.1	27.41	47.7	10.2	26.8	30.9	24.5	27.43	42.6	7.2
1832	25.2	30.3	24.3	26.60	41.0	7.2	34.0	36.9	33.2	34.77	48.9	25.2	33.9	37.8	32.3	34.65	63.5	18.5
1833	29.8	33.2	29.6	30.86	40.3	18.5	32.6	35.8	32.2	33.49	42.1	18.5	30.2	36.9	28.9	32.00	58.4	19.6
1834	29.6	32.3	30.1	30.31	39.4	16.2	31.8	36.6	30.9	33.10	45.5	20.7	29.7	36.4	28.4	31.53	48.4	15.1
Means	26.66	30.02	25.98	29.56	40.32	10.82	30.18	34.34	29.7	31.58	45.72	14.8	27.54	33.36	26.4	29.93	51.66	12.18

	April.						May.						June.					
1828				36.7						41.2						46.8		
1829				33.8						41.2						46.8		
1830	36.9	40.8	34.8	37.5	50.7	29.7	39.5	42.6	37.3	40.0	55.6	32.7	45.7	46.3	42.3	44.8	56.7	40.3
1831	31.7	38.2	29.8	33.21	46.2	16.2	37.2	41.0	35.6	37.94	52.2	27.5	45.0	48.1	42.0	45.02	57.9	34.2
1832	36.3	39.3	34.4	36.66	47.7	25.9	45.3	45.5	38.6	42.59	61.2	32.7	47.2	50.4	45.4	47.64	66.9	42.1
1833	36.8	39.3	34.4	36.81	47.7	18.5	43.2	45.2	40.6	43.0	61.2	36.5	45.7	48.2	43.2	46.21	66.9	43.2
1834	34.2	38.3	33.5	35.33	53.4	26.4	40.6	49.3	39.0	43.0	58.3	31.3						
Means	35.18	39.18	33.38	35.72	49.14	23.34	41.16	44.72	38.22	41.28	57.70	32.14	45.90	48.25	43.22	46.21	62.1	39.95

Temperature observations at Ilioulíouk, Unalaska, from 1827 *to* 1834, *old style*—Continued.

Years	July.						August.						September.						Yearly Means.
	A. M.	Noon.	P. M.	Mean.	Max.	Min.	A. M.	Noon.	P. M.	Mean.	Max.	Min.	A. M.	Noon.	P. M.	Mean.	Max.	Min.	
1827.																			
1828	.....	.....	.....	50.9	.....	.....	.....	.....	.....	56.7	.....	.....	.....	.....	.....	45.9			
1829	49.5	53.8	47.5	50.3	67.8	43.2	47.6	51.7	46.4	48.5	64.6	38.3	45.3	48.5	43.8	45.7	56.9	30.9	
1830	50.4	53.3	47.0	50.4	71.4	42.1	53.9	56.9	50.3	53.7	77.0	43.9	42.5	46.1	42.3	43.3	50.0	28.6	
1831	46.6	48.2	43.8	46.19	64.6	39.4	46.6	51.3	44.4	47.45	61.2	40.3	39.9	43.1	37.9	40.32	52.2	32.0	
1832	51.4	54.5	49.0	51.66	70.2	43.2	53.6	58.4	52.5	54.90	77.0	42.1	40.1	45.5	40.1	41.90	59.0	25.9	
1833	53.9	57.5	51.1	54.17	76.3	44.8	49.8	53.8	47.0	50.20	73.6	38.1	43.3	47.9	43.4	44.87	54.5	32.0	
1834.																			
Means	50.36	53.46	47.68	50.60	70.06	42.54	50.3	54.42	48.12	51.91	70.68	40.54	42.22	46.22	41.40	43.66	54.48	29.88	

	October.						November.						December.						
1827	.....	.....	.....	35.8	.....	.....	.....	.....	.....	36.5	.....	.....	.....	.....	.....	35.4			
1828	.....	.....	.....	38.5	.....	.....	.....	.....	.....	31.8	.....	.....	.....	.....	.....	25.0	.....	.....	38.05
1829	37.6	40.5	37.0	38.3	54.5	26.8	33.2	36.5	32.8	34.2	54.5	18.5	29.0	31.5	27.9	29.40	46.6	12.0	36.41
1830	35.9	38.3	36.0	36.7	46.6	24.6	28.7	31.9	28.6	29.7	43.9	14.7	24.8	27.1	23.7	25.20	42.1	7.9	35.51
1831	35.1	38.7	34.4	36.05	45.5	23.0	32.0	34.6	31.8	32.76	39.9	19.6	29.9	32.8	29.3	30.65	39.9	12.9	35.46
1832	34.1	37.6	35.1	35.60	48.9	24.1	33.5	35.2	33.7	34.13	47.7	26.4	29.3	31.3	30.1	30.26	45.5	18.5	38.52
1833	34.7	39.2	34.3	36.07	48.9	20.8	26.3	31.4	26.3	27.99	37.2	6.1	26.7	29.0	26.1	27.30	38.7	5.0	37.73
1834.																			
Means	35.48	38.86	35.36	36.72	48.88	23.86	30.74	33.92	30.64	32.44	44.64	17.06	27.94	30.34	27.42	29.03	42.56	11.26	37.28

Observations of the weather at Ilioulíouk, Unalaska, for seven years, 1825, 1826, 1829,* 1830, 1831, 1832, 1833, 1834,* *old style.*

Months.	Without clouds.	Clear, with clouds.	Changeable.	Cloudy.	Rain.	Snow.	Fog.	Total thunder-storms.	Total earthquakes.
January	11	32	111	55	58	118	15	0	5
February	9	33	86	69	51	94	29	0	2
March	3	26	112	76	51	134	10	2	3
April	4	26	104	76	91	96	16	2	4
May	2	29	105	81	106	31	49	1	1
June	6	24	95	85	83	4	76	0	1
July	0	22	118	77	75	0	75	1	1
August	5	29	106	77	113	2	62	2	4
September	2	28	107	73	143	39	33	3	3
October	2	21	115	91	113	90	18	5	7
November	3	29	88	90	84	126	9	1	1
December	6	13	116	82	47	132	6	0	0
Total	53	312	1,263	932	1,015	866	398	17	32

* Part of each of these years. Three observations each day.

Thunder-storms and earthquakes noted in the above period as follows:

Year.	Thunder-storms.	Earth-quakes.
1825	1	7
1826	2	5
1830	0	2
1831	4	4
1832	6	7
1833	4	4
1829 and 1834	0	3
Total	17	32

Observations for direction of wind at Ilioulíouk, Unalaska, for 1825, 1826, 1827,* 1828, 1829,† 1830, 1831, 1832, 1833, 1834, *old style.*

Months.	Direction.								
	North.	Northeast	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms and high airs.
January	120	22	52	74	88	29	49	60	138
February	58	20	81	66	74	45	48	62	148
March	81	16	48	83	84	66	83	98	81
April	53	32	63	81	81	87	79	67	90
May	40	42	78	76	68	63	87	81	113
June	34	38	56	84	89	77	41	47	130
July	21	23	17	72	94	130	73	22	141
August	37	16	15	74	76	85	101	54	176
September	67	19	25	58	55	82	114	63	149
October	52	13	29	54	55	94	92	107	156
November	68	18	37	57	57	69	122	73	133
December	139	20	47	39	50	52	55	114	134
Separate observations in 1827, 1828, and 1829.	196	113	219	242	256	143	144	154	642
Total	966	401	767	1,060	1,127	1,022	1,089	1,002	2,231

* January, February, March, April, October, November, December.
† First six months. In this time about 160 observations lost.

Observations for the force of wind at Ilioulíouk, Unalaska, for seven years between 1825 *and* 1834, *old style.*

Months.	Force.				
	Light.	Moderate.	Fresh.	Strong.	Very strong.
January	236	137	59	41	12
February	227	114	63	36	8
March	255	167	80	46	7
April	250	167	95	33	5
May	272	167	66	21	0
June	330	112	43	9	1
July	279	104	53	13	0
August	265	145	48	9	1
September	206	131	85	46	2
October	209	139	79	46	8
November	234	115	77	54	4
December	217	116	82	73	8
Total	2,980	1,634	830	427	66

Three observations each day.
NOTE.—On the 17th of March and 29th of October, 1833, the wind was extraordinarily strong.

Journal of meteorological observations at the village of Ilioulíouk, island of Unalaska, from October 1866 to April 1867 by the Rev. Innocent Shayesnikoff, priest of the Unalaska district.

Time.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1866.		°	°		
Oct. 29	8 a. m.	40	.....	NW., moderate	Sunshine and clouded.
	Noon ..	50	.....	W. NW., moderate	Sky interchanging the whole day.
	8 p. m.	42	44.0	.....do.	
30	8 a. m.	40	.....	S. SW., light.....	Sunshine and clouded.
	Noon ..	48	.....	S. SE., moderate.....	Sky interchanging.
	8 p. m.	46	44.7	S. SW., moderate.....	Overcast or gloomy.
31	8 a. m.	40	.....	.....do.....	Clear.
	Noon ..	43	.....	W. SW., moderate	Sunshine.
	8 p. m.	41	41.3	.....do.....	Clear and at times rain.
Nov. 1	8 a. m.	40	.....	W. SW., fresh.....	Sunshine and clear all day, but in the evening rain.
	Noon ..	42	.....	.....do.	
	8 p. m.	39	40.3	.....do.	
2	8 a. m.	38	.....	W., moderate	Sunshine and clear, but at times a wet snow falling.
	Noon ..	40	.....	.....do.	
	8 p. m.	36	38.0	.....do.	{rain.
3	8 a. m.	36	.....	E., very strong	Overcast or gloomy, and much wet snow and strong
	Noon ..	38	.....	E. SE., very strong.	
	8 p. m.	40	38.0	S. SW., moderate.....	Clear and at times rain.
4	8 a. m.	40	.....	S. SE., fresh.....	Clear and sunshine, showers.
	Noon ..	44	.....	S. SE., moderate	Clear and sunshine.
	8 p. m.	41	41.7	.....do.....	Clear and sunshine, with showers.
5	8 a. m.	39	.....	W. NW., fresh.....	Overcast, wet snow.
	Noon ..	38	.....	NW., very strong	Overcast, hail.
	8 p. m.	33	36.7	.....do.....	Do.
6	8 a. m.	33	.....	W., moderate	Sunshine and at times hail, clear, and clouded.
	Noon ..	39	.....	SW., moderate.	
	8 p. m.	36	36.0	S. SE., light.....	Overcast and fine snow.
7	8 a. m.	30	.....	NW., moderate	Sunshine, at times snow.
	Noon ..	38	.....	.....do.....	Clear and sunshine.
	8 p. m.	30	32.7	.....do.....	Overcast, at times snow.
8	8 a. m.	29	.....	NW., moderate	Clear and sunshine, without clouds.
	Noon ..	41	.....	.....do.	
	8 p. m.	38	36.0	E. SE., fresh	Overcast and wet snow.
9	8 a. m.	39	.....	Calm	Overcast and dark.
	Noon ..	44	.....	W. SW., light.....	Clear and sunshine, without clouds.
	8 p. m.	38	40.3	S. SW., light.	
10	8 a. m.	33	.....	.....do.....	Do.
	Noon ..	44	.....	N. NE., light.....	Do.
	8 p. m.	29	35.3	.....do.....	Do.
11	8 a. m.	35	.....	.....do.....	Cloudy and at times snow.
	Noon ..	41	.....	.....do.....	Clear and sunshine.
	8 p. m.	29	35.0	.....do.....	Clear and without clouds.
12	8 a. m.	26	.....	.....do.....	Do.
	Noon ..	33	.....	.....do.....	Clear, sunshine, and without clouds.
	8 p. m.	26	28.3	.....do.....	Clear and without clouds.
13	8 a. m.	26	.....	N. NE., fresh	Do.
	Noon ..	37	.....	.....do.....	Do.
	8 p. m.	36	36.3	.....do.....	Do.
14	8 a. m.	34	.....	.....do.....	Do.
	Noon ..	35	.....	.....do.....	Clear, sunshine, clouds.
	8 p. m.	32	33.7	N. NW., fresh	Clear and variable.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1866.		°	°		
Nov. 15	8 a. m..	29	.....	NW., moderate	Clear and occasional snow.
	Noon ..	36	.....	W. NW., moderate.....	Do.
	8 p. m..	33	32. 7	W., moderate	Do.
16	8 a. m..	27	.....	N. NE., light.....	Clear and without clouds.
	Noon ..	41	.....	....do.....	Do.
	8 p. m..	32	33. 3	N. NW., fresh.....	Clear and occasional snow.
17	8 a. m..	32	.....	N. NE., moderate	Clear and without clouds.
	Noon ..	39	.....	....do.....	Clear, sunshine, clouds.
	8 p. m..	32	34. 3	....do.....	Do.
18	8 a. m..	38	.....	SE., very fresh.....	Gloomy and at times snow.
	Noon ..	40	.....	E. SE., very fresh	Overcast and wet snow.
	8 p. m..	40	39. 7	....do.....	Overcast and rain.
19	8 a. m..	41	.....	E., very fresh.....	Do.
	Noon ..	42	.....	....do.....	Do.
	8 p. m..	38	40. 3	E. NE., very fresh	Do.
20	8 a. m..	40	.....	E., fresh	Do.
	Noon ..	41	.....	E. NE., fresh.....	Do.
	8 p. m..	38	39. 7	N. NE., very fresh	Cloudy and at times rain.
21	8 a. m..	39	.....	NE., moderate	Overcast and at times rain.
	Noon ..	42	.....	E. NE., moderate	Do.
	8 p. m..	39	40. 0	....do.....	Clear and at times rain.
22	8 a. m..	32	.....	N. NE., moderate	Clear and cloudy.
	Noon ..	42	.....	....do.....	Do.
	8 p. m..	41	38. 3	....do.....	Overcast and rain.
23	8 a. m..	37	.....	NE., moderate	Do.
	Noon ..	42	.....	....do.....	Do.
	8 p. m..	41	40. 0	....do.....	Do.
24	8 a. m..	39	.....	N. NE., light.....	Overcast and wet snow.
	Noon ..	40	.....	....do.....	Do.
	8 p. m..	35	38. 0	N. NE., moderate	Do.
25	8 a. m..	35	.....	W., moderate	Clear and clouds.
	Noon ..	42	.....	....do.....	Do.
	8 p. m..	35	37. 3	W. NW., very fresh.....	Overcast, wet snow.
26	8 a. m..	30	.....	NW., fresh	Clear and at times snow.
	Noon ..	34	.....	....do.....	Clear and sunshine.
	8 p. m..	30	31. 3	....do.....	Clear and at times snow.
27	8 a. m..	29	.....	W. NW., moderate.....	Do.
	Noon ..	40	.....	N. NE., light.....	Clear and without clouds.
	8 p. m..	34	34. 3	E. NE., fresh.....	Overcast, snow.
28	8 a. m..	34	.....	NE., fresh	Do.
	Noon ..	38	.....	NE., moderate	Do.
	8 p. m..	36	36. 0	N. NE., fresh	Clear and at times hailing.
29	8 a. m..	26	.....	Calm.....	Clear and sunshine.
	Noon ..	35	.....	....do.....	Overcast, snow.
	8 p. m..	34	31. 7	N. NE., fresh	Clear and at times snow.
30	8 a. m..	31	.....	.....	Do.
*	Noon ..	31	.....	.....	Clear, clouds.
	8 p. m..	29	30. 3	.....	Do.
Dec. 1	8 a. m..	29	.....	.....	Clear and at times snow.
	Noon ..	28	.....	.....	Gloomy and thick snow.
	8 p. m..	25	27. 3	.....	Gloomy and at times snow.

* Mean temperature for November, 36. 1 degrees. Wind, N. NE. Rain; snow.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1866.		°	°		
Dec. 2	8 a. m..	24	.....	.....	Clear and at times snow.
	Noon ..	24	.....	.....	Do.
	8 p. m..	25	24.3	.....	Do.
3	8 a. m..	20	.....	.....	Do.
	Noon ..	34	.....	.....	Clear and sunshine.
	8 p. m..	25	26.3	.....	Cloudy and thick snow.
4	8 a. m..	21	.....	.....	Clear and at times snow.
	Noon ..	30	.....	.....	Do.
	8 p. m..	24	25.0	.....	Cloudy and at times snow.
5	8 a. m..	24	.....	.....	Clear and variable.
	Noon ..	28	.....	.....	Do.
	8 p. m..	28	26.6	.....	Cloudy and pouring rains.
6	8 a. m..	32	.....	.....	Do.
	Noon ..	39	.....	.....	Cloudy, rain, and snow.
	8 p. m..	39	36.6	.....	Cloudy and rain.
7	8 a. m..	39	.....	E., fresh	Overcast, rain, and snow.
	Noon ..	40	.....	N. NE., light	Clear and at times rain.
	8 p. m..	38	39.0	..... do	Do.
8	8 a. m..	39	.....	S. SE., moderate.....	Clear and variable.
	Noon ..	40	.....	..... do	Do.
	8 p. m..	39	39.3	SW., moderate.....	Do.
9	8 a. m..	33	.....	..... do	Clear, sunshine.
	Noon ..	35	.....	..... do	Do.
	8 p. m..	36	34.6	SE., fresh.....	Clear and cloudy.
10	8 a. m..	38	.....	E. NE., very fresh	Overcast and much rain.
	Noon ..	42	.....	..... do	Do.
	8 p. m..	40	40.0	..... do	Cloudy and fine rain.
11	8 a. m..	39	.....	S. SW., very fresh	Cloudy and at times rain.
	Noon ..	40	.....	SW., very fresh.....	Cloudy and heavy rain.
	8 p. m..	38	39.0	S. SE., moderate	Clear and at times rain.
12	8 a. m..	36	.....	..... do	Do.
	Noon ..	44	.....	..... do	Do.
	8 p. m..	33	37.6	..... do	Cloudy and at times rain.
13	8 a. m..	37	.....	..... do	Clear and at times rain.
	Noon ..	41	.....	..... do	Cloudy and at times rain.
	8 p. m..	38	38.6	..... do	Clear and at times rain.
14	8 a. m..	35	.....	S. SW., moderate	Clear and cloudy.
	Noon ..	39	.....	..... do	Clear, sunshine, and at times rain.
	8 p. m..	35	.....	..... do	Do.
15	8 a. m..	37	.....	E., very fresh.....	Dark and fine rain.
	Noon ..	38	.....	E. NE., very strong.....	Cloudy and wet snow.
	8 p. m..	38	37.6	E. SE., very fresh.....	Clear and at times rain.
16	8 a. m..	39	.....	E., very fresh.....	Cloudy and heavy rain.
	Noon ..	43	.....	..... do	Do.
	8 p. m..	41	41.0	..... do	Do.
17	8 a. m..	36	.....	NE., light.....	Cloudy and thick snow.
	Noon ..	39	.....	Calm	Clear and sunshine.
	8 p. m..	36	37.0	S. SE., moderate	Clear and at times rain.
18	8 a. m..	36	.....	..... do	Do.
	Noon ..	39	.....	..... do	Do.
	8 p. m..	35	36.6	..... do	Do.
19	8 a. m..	35	.....	Calm	Cloudy and heavy snow.
	Noon ..	39	.....	..... do	Fog and fine snow.
	8 p. m..	37	37.9	E. NE., moderate	Clear and cloudy.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1866.		°	°		
Dec. 20	8 a. m..	34	.....	SW., moderate.....	Clear and at times rain.
	Noon ..	39	.....	S. SW., moderate	Do.
	8 p. m..	36	36.3	S. SW., fresh	Do.
21	8 a. m..	31	.....	N., fresh.....	Clear and cloudy.
	Noon ..	30	.....	N., very fresh.....	Cloudy and at times snow.
	8 p. m..	26	29.0	..... do	Clear and cloudy.
22	8 a. m..	26	.....	Calm	Do.
	Noon ..	29	.....	NE., fresh	Dark, pouring rains.
	8 p. m..	34	29.6	E. NE., very fresh.....	Do.
23	8 a. m..	30	.....	N. NE., moderate.....	Clear and no clouds.
	Noon ..	37	.....	N. NE., light	Clear and sunshine.
	8 p. m..	34	33.3	E. NE., fresh.....	Clear and cloudy.
24	8 a. m..	30	.....	N. NE., fresh.....	Clear and without clouds.
	Noon ..	35	.....	..... do	Clear and at times snow.
	8 p. m..	26	30.3	N. NE., light.....	Clear and without clouds.
25	8 a. m..	25	.....	..... do	Do.
	Noon ..	35	.....	..... do	Clear, sunshine, clouds.
	8 p. m..	35	31.6	N. NE., fresh	Clear and cloudy.
26	8 a. m..	37	.....	NE., moderate	Dark, rain.
	Noon ..	42	.....	.....do.....	Do.
	8 p. m..	37	38.6	N. NE., very fresh	Dark and wet snow.
27	8 a. m..	34	.....	.....do.....	Do.
	Noon ..	30	.....	N. NW., very strong.....	Dark and at times snow.
	8 p. m..	29	31.0	NW., very strong.....	Dark and snow.
28	8 a. m..	31	.....	W. NW., fresh	Dark and at times snow.
	Noon ..	33	.....	.....do.....	Do.
	8 p. m..	36	33.3	W., fresh	Do.
29	8 a. m..	30	.....	W. NW., fresh.....	Do.
	Noon ..	31	.....	.....do.....	Do.
	8 p. m..	30	30.3	.....do.....	Do.
30	8 a. m..	23	.....	N. NE., light.....	Clear and without clouds.
	Noon ..	31	.....	Calm	Clear and sunshine.
	8 p. m..	36	30.0	E. NE., moderate	Clear and at times rain.
31	8 a. m..	36	.....	E. SE., moderate.....	Do.
*	Noon ..	39	.....	E. SE., fresh	Do.
	8 p. m..	36	37.0	E. NE., fresh.....	Dark and wet snow.
1867.					
Jan. 1	8 a. m..	35	.....	E., moderate.....	Dark and heavy rain.
	Noon ..	36	.....	E. SE., moderate.....	Clear and at times rain.
	8 p. m..	36	35.6	E., moderate	Dark and heavy rain.
2	8 a. m..	36	.....	S. SE.. light.....	Clear and at times rain.
	Noon ..	39	.....	S. SW., moderate.....	Do.
	8 p. m..	36	37.0	E. SE., very fresh	Dark and fine snow.
3	8 a. m..	36	.....	S., fresh	Clear and at times snow.
	Noon ..	37	.....	.....do.....	Do.
	8 p. m..	36	36.3	S. SW., moderate	Do.
4	8 a. m..	32	.....	.....do.....	Do.
	Noon ..	39	.....	S., moderate	Do.
	8 p. m..	35	35.3	N. NE., very fresh	Dark and wet snow.
5	8 a. m..	35	.....	N. NE., light.....	Do.
	Noon ..	38	.....	.....do.....	Clear and sunshine.
	8 p. m..	36	36.3	N. NE., fresh	Clear and cloudy.

*Mean temperature for December, 33.87 degrees.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Jan. 6	8 a. m..	34	.....	N. NE., fresh.....	Dark and fine snow.
	Noon ..	35	.....	.....do.....	Clear and fine snow.
	8 p. m..	32	33. 3	N. NW., moderate	Clear and without clouds.
7	8 a. m..	32	.....	N., very fresh.....	Clear and cloudy.
	Noon ..	33	.....	.....do.....	Dark and fine snow.
	8 p. m..	34	33. 0	N. NE., very strong.....	Dark and heavy.
8	8 a. m..	33	.....	W., very fresh	Dark and fine snow.
	Noon ..	35	.....	W. SW., fresh	Dark and snow at times.
	8 p. m..	33	33. 3	S. SW., fresh.....	Do.
9	8 a. m..	33	.....	S. SW., moderate	Clear and snow at times.
	Noon ..	37	.....	.....do.....	Clear and sunshine.
	8 p. m..	28	32. 6	S. SW., light.....	Clear and without clouds.
10	8 a. m..	27	.....	.....do.....	Clear and clouds.
	Noon ..	38	.....	S. SE., light.....	Do.
	8 p. m..	35	33. 3	E. SE., light.....	Do.
11	8 a. m..	35	.....	E. NE., moderate	Dark and snow.
	Noon ..	36	.....	NE., moderate	Dark and fine rain.
	8 p. m..	37	36. 0	N. NE., moderate	Do.
12	8 a. m..	34	.....	.....do.....	Dark and rain.
	Noon ..	41	.....	.....do.....	Dark and snow.
	8 p. m..	43	36. 0	N., fresh.....	Do.
13	8 a. m..	30	.....	.....do.....	Clear and without clouds.
	Noon ..	32	.....	.....do.....	Do.
	8 p. m..	29	30. 3	N., very fresh.....	Do.
14	8 a. m..	26	.....	N. NW., very fresh.....	Clear and at times clouds.
	Noon ..	27	.....	.....do.....	Do.
	8 p. m..	26	26. 3	N., very fresh.....	Do.
15	8 a. m..	25	.....	N. NW., very fresh.....	Clear and at times snow.
	Noon ..	24	.....	.....do.....	Do.
	8 p. m..	24	24. 3	N., very fresh.....	Do.
16	8 a. m..	30	.....	N. NE., fresh	Clear and sunshine.
	Noon ..	31	.....	.....do.....	Clear and clouds.
	8 p. m..	28	29. 6	.....do.....	Do.
17	8 a. m..	26	.....	.....do.....	Do.
	Noon ..	30	.....	.....do.....	Do.
	8 p. m..	31	29. 0	N. NW., very fresh.....	Clear and at times snow.
18	8 a. m..	25	.....	N., fresh.....	Clear and at times clouds.
	Noon ..	29	.....	.....do.....	Do.
	8 p. m..	26	26. 6	N. NW., fresh.....	Clear and cloudy.
19	8 a. m..	29	.....	N. NW., moderate	Clear and at times snow.
	Noon ..	35	.....	N., moderate	Clear and sunshine.
	8 p. m..	26	30. 0	.....do.....	Clear and without clouds.
20	8 a. m..	19	.....	N. NE., light.....	Do.
	Noon ..	32	.....	.....do.....	Clear and sunshine.
	8 p. m..	28	26. 3	Calm.....	Clear and at times clouds.
21	8 a. m..	26	.....	.....do.....	Do.
	Noon ..	38	.....	.....do.....	Clear and sunshine.
	8 p. m..	29	31. 0	.....do.....	Clear and without clouds.
22	8 a. m..	31	.....	.....do.....	Do.
	Noon ..	37	.....	E. NE., moderate.....	Do.
	8 p. m..	29	32. 3	Calm.....	Do.
23	8 a. m..	25	.....	N. NE., moderate.....	Clear and at times clouds.
	Noon ..	34	.....	.....do.....	Do.
	8 p. m..	30	29. 6	E. NE., moderate	Clear and cloudy.

Journal of meteorological observations, &c.—Continued.

Date.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Jan. 24	8 a. m..	34	.....	NE., fresh.....	Overcast or dark and fine snow.
	Noon ..	35	.....	------do.....	Overcast and heavy snow.
	8 p. m..	33	34.0	------do.....	Overcast and at times snow.
25	8 a. m..	34	.....	N. NE., moderate	Clear and cloudy.
	Noon ..	34	.....	N., fresh	Do.
	8 p. m..	23	30.3	------do.....	Clear and without clouds.
26	8 a. m..	27	.....	NW., moderate	Clear and cloudy.
	Noon ..	33	.....	W. NW., moderate	Clear and sunshine.
	8 p. m..	25	28.3	N. NW., moderate.....	Clear and without clouds.
27	8 a. m..	25	.....	Calm.....	Clear and at times clouds.
	Noon ..	32	.....	W., moderate	Clear and at times snow.
	8 p. m..	26	30.6	------do.....	Clear and at times clouds.
28	8 a. m..	35	.....	------do.....	Clear and without clouds.
	Noon ..	36	.....	SW., moderate	Clear and at times snow.
	8 p. m..	35	35.3	Calm.....	Do.
29	8 a. m..	36	.....	E., fresh	Clear and without clouds.
	Noon ..	38	.....	------do.....	Clear and cloudy.
	8 p. m..	35	36.3	NE., very strong.....	Do.
30	8 a. m..	36	.....	E. NE., very strong.....	Dark and wet snow.
	Noon ..	38	.....	NE., fresh.....	Dark and fine snow.
	8 p. m..	35	36.3	------do.....	Dark and at times rain.
31	8 a. m..	29	.....	N., gale	Dark and fine snow.
*	Noon ..	27	.....	------do.....	Clear and cloudy.
	8 p. m..	21	25.6	------do.....	Cloudy and snow.
Feb. 1	8 a. m..	20	.....	------do.....	Clear and at times snow.
	Noon ..	22	.....	N. NW., fresh	Cloudy and at times snow.
	8 p. m..	20	20.7	NW., fresh	Do.
2	8 a. m..	15	.....	------do.....	Do.
	Noon ..	16	.....	------do.....	Clear and at times snow.
	8 p. m..	13	14.7	------do.....	Do.
3	8 a. m..	17	.....	------do.....	Do.
	Noon ..	20	.....	N. NW., fresh.....	Do.
	8 p. m..	13	16.7	N., very fresh.....	Do.
4	8 a. m..	16	.....	N. NW., fresh	Clear and cloudy.
	Noon ..	20	.....	------do	Clear and at times snow.
	8 p. m..	17	17.7	W. NW., moderate.....	Clear and cloudy.
5	8 a. m..	27	.....	E. NE., very fresh	Dark and snow.
	Noon ..	31	.....	------do.....	Dark.
	8 p. m..	34	30.7	NE., moderate	Dark and snow.
6	8 a. m..	30	.....	Calm.....	Clear and without clouds.
	Noon ..	44	.....	------do.....	Clear, sunshine, and clouds.
	8 p. m..	33	35.7	------do.....	Cloudy and at times snow.
7	8 a. m..	32	.....	------do.....	Do.
	Noon ..	49	.....	------do.....	Do.
	8 p. m..	34	38.3	S. SE., moderate	Clear and at times clouds.
8	8 a. m..	30	.....	S. SW., moderate.	
	Noon ..	44	.....	SW., moderate.	
	8 p. m..	33	35.6	E. SE., very fresh.	
9	8 a. m..	39	.....	S., fresh.	
	Noon ..	42	.....	SW., fresh.	
	8 p. m..	33	38.0	------do.	

* Mean temperature for January, 31.66 degrees.

Journal of meteorological observations, &c.—Continued.

Date.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Feb. 10	8 a. m..	32	.....	S. SW., fresh.	
	Noon ..	36	.....	SW., fresh.	
	8 p. m..	32	33. 3	E. SE., fresh.	
11	8 a. m..	36	.....	S. SE., moderate.	
	Noon ..	45	.....	....do.	
	8 p. m..	35	38. 6	Calm.	
12	8 a. m..	27	.....	W. NW., very strong.	
	Noon ..	28	.....	NW., fresh.	
	8 p. m..	26	27. 0	N. NW., fresh.	
13	8 a. m..	29	.....	Calm.	
	Noon ..	34	.....	....do.	
	8 p. m..	36	33. 0	SW., moderate.	
14	8 a. m..	44	.....	S., moderate.....	Clear and cloudy.
	Noon ..	45	.....	....do.	Do.
	8 p. m..	48	45. 6	....do.....	Do.
15	8 a. m..	40	.....	....do.....	Do.
	Noon ..	52	.....	....do.....	Clear and without clouds.
	8 p. m..	42	44. 6	....do.....	Clear and at times rain.
16	8 a. m..	37	.....	S. SW., fresh.....	Clear and at times hail.
	Noon ..	37	.....	SW., fresh	Dark and at times snow.
	8 p. m..	34	36. 0	S. SW., fresh.....	Clear and without clouds.
17	8 a. m..	26	.....	Calm	Do.
	Noon ..	42	.....	....do.....	Clear, sunshine, and clouds.
	8 p. m..	34	34. 0	E. NE., fresh	Clear and cloudy.
18	8 a. m..	34	.....	E. NE., very fresh	Dark and wet snow.
	Noon ..	36	.....	SW., very fresh	Do.
	8 p. m..	35	35. 0	....do.....	Do.
19	8 a. m..	34	.....	W. NW., fresh.....	Clear and at times cloudy.
	Noon ..	38	.....	W. NW., moderate.....	Clear and without clouds.
	8 p. m..	29	33. 3	N. NE., moderate	Do.
20	8 a. m..	39	.....	S., fresh.....	Clear and cloudy.
	Noon ..	44	.....	....do.....	Dark and fine snow.
	8 p. m..	42	41. 6	....do.....	Clear and cloudy.
1	8 a. m..	44	.....	S., fresh	Clear and cloudy.
	Noon ..	48	.....	....do	Do.
	8 p. m..	38	43. 3	S., moderate	Clear and dark weather.
22	8 a. m..	37	.....	SW., fresh	Clear and without clouds.
	Noon ..	44	.....	W. SW., fresh	Do.
	8 p. m..	34	38. 3	....do.....	Clear and cloudy.
23	8 a. m..	35	.....	W. SW., moderate	Clear and without clouds.
	Noon ..	36	.....	W., moderate	Clear and at times snow.
	8 p. m..	34	35. 0	SW., fresh	Do.
24	8 a. m..	26	.....	W. NW., very fresh.....	Clear and cloudy.
	Noon ..	25	.....	N. NW., very fresh.....	Do.
	8 p. m..	21	24. 0	N., fresh	Do.
25	8 a. m..	26	.....	Calm	Clear and without clouds.
	Noon ..	29	.....	....do.....	Do.
	8 p. m..	17	24. 0	....do.....	Do.
26	8 a. m..	32	.....	....do.....	Clear, sunshine, without clouds.
	Noon ..	35	.....	E. SE., moderate.....	Do.
	8 p. m..	33	33. 3	SE., fresh.....	Clear and cloudy.
27	8 a. m..	39	.....	S. SE., fresh	Do.
	Noon ..	41	.....	....do.....	Do.
	8 p. m..	35	38. 3	....do.....	Do.

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Date.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Feb. 28	8 a. m..	36	.....	S. SE., fresh.....	Clear, sunshine, and at times clouds.
*	Noon ..	40	.....	.....do.....	Do.
	8 p. m..	34	36. 6	SE., fresh.....	Clear and without clouds.
Mar. 1	8 a. m..	35	.....	S. SE., light.....	Clear, sunshine, without clouds.
	Noon ..	39	.....	Calm	Do.
	8 p. m..	32	35. 3	.....do.....	Do.
2	8 a. m..	33	.....	.....do.....	Do.
	Noon ..	43	.....	.....do.....	Do.
	8 p. m..	28	34. 6	.....do.....	Do.
3	8 a. m..	32	.....	.....do.....	Clear and cloudy.
	Noon ..	45	.....	.....do.....	Clear and without clouds.
	8 p. m..	32	36. 3	.....do.....	Clear and cloudy.
4	8 a. m..	32	.....	N. NE., moderate	Clear and without clouds.
	Noon ..	36	.....	.....do.....	Clear, sunshine, without clouds.
	8 p. m..	32	33. 3	N. NE., fresh	Clear and at times clouds.
5	8 a. m..	35	.....	NE., moderate	Dark and fine snow.
	Noon ..	43	.....	.....do.....	Dark and wet snow.
	8 p. m..	36	38. 0	E. NE., moderate	Dark and rain.
6	8 a. m..	37	.....	.....do.....	Dark and wet snow.
	Noon ..	39	.....	E., moderate	Dark and heavy rain.
	8 p. m..	35	.....	E. NE., light.....	Dark and fine snow.
7	8 a. m..	39	.....	SW., fresh	Clear and cloudy.
	Noon ..	41	.....	.....do.....	Clear and sunshine, no clouds.
	8 p. m..	29	36. 3	Calm	Clear and without clouds.
8	8 a. m..	35	.....	E. NE., fresh	Dark and fine snow.
	Noon ..	37	.....	E., very fresh.....	Dark and fine rain.
	8 p. m..	35	35. 6	.....do.....	Dark and heavy rain.
9	8 a. m..	38	.....	E. SE., very fresh.....	Do.
	Noon ..	40	.....	.....do.....	Clear and at times rain.
	8 p. m..	36	38. 0	E., very fresh	Gloomy and heavy rain.
10	8 a. m..	36	.....	SE., fresh	Cloudy and at times rain.
	Noon ..	45	.....	S. SE., fresh	Do.
	8 p. m..	34	38. 3	.....do.....	Clear and at times rain.
11	8 a. m..	32	.....	E. NE., fresh	Dark and thick snow.
	Noon ..	42	.....	S. SE., fresh	Clear and at times snow.
	8 p. m..	34	35. 6	S. SE., moderate	Cloudy and at times snow.
12	8 a. m..	31	.....	Calm	Clear, sunshine, without clouds.
	Noon ..	43	.....	.....do.....	Do.
	8 p. m..	29	36. 3	.....do.....	Do.
13	8 a. m..	37	.....	.....do.....	Do.
	Noon ..	42	.....	.....do.....	Do.
	8 p. m..	32	36. 0	.....do.....	Do.
14	8 a. m..	34	.....	S. SE., fresh	Clear and cloudy.
	Noon ..	39	.....	.....do.....	Do.
	8 p. m..	37	37. 0	NE., fresh	Do.
15	8 a. m..	35	.....	N. NE., fresh.....	Dark and thick snow.
	Noon ..	47	.....	N. NW., moderate	Clear and cloudy.
	8 p. m..	35	39. 0	W. NW., light	Do.
16	8 a. m..	33	.....	Calm.....	Do.
	Noon ..	48	.....	.....do.....	Clear, sunshine, and cloudy.
	8 p. m..	35	38. 6	E. NE., fresh.....	Dark and wet snow.

*Mean temperature for February, 33.32 degrees.

Journal of meteorological observations, &c.—Continued.

Date.	Hours.	Therm., Fahr.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Mar. 17	8 a. m..	40	.....	S. SE., moderate	Clear and cloudy.
	Noon ..	45	.....	S. SE., light.....	Do.
	8 p. m..	36	40. 3	.....do.....	Cloudy and at times rain.
18	8 a. m..	38	.....	.....do.....	Do.
	Noon ..	40	.....	.....do.....	Clear and at times rain.
	8 p. m..	31	36. 3	Calm.....	Clear and without clouds.
19	8 a. m..	38	.....	.....do.....	Clear and cloudy.
	Noon ..	44	.....	S. SE., light.....	Do.
	8 p. m..	37	39. 6	E., fresh	Gloomy and heavy rain.
20	8 a. m..	45	.....	S., fresh.....	Clear, sunshine, at times clouds.
	Noon ..	46	.....	.....do.....	Do.
	8 p. m..	42	44. 3	E. SE., fresh	Dark and rain.
21	8 a. m..	44	.....	S. SE., fresh.....	Clear and at times rain.
	Noon ..	45	.....	.....do.....	Clear, sunshine, at times clouds.
	8 p. m..	40	43. 0	E. SE., fresh	Gloomy and heavy rain.
22	8 a. m..	42	.....	S. SE., fresh	Clear and at times rain.
	Noon ..	49	.....	.....do.....	Clear and cloudy.
	8 p. m..	39	43. 6	S. SW., fresh.....	Do.
23	8 a. m..	38	.....	S. SE., fresh.....	Do.
	Noon ..	43	.....	.....do.....	Clear, sunshine, without clouds.
	8 p. m..	42	41. 0	E. SE., fresh.....	Dark and rain.
24	8 a. m..	41	.....	SE., fresh.....	Do.
	Noon ..	44	.....	.....do.....	Clear and cloudy.
	8 p. m..	37	40. 6	S. SW., moderate	Do.
25	8 a. m..	42	.....	.....do.....	Dark and fine snow.
	Noon ..	43	.....	.....do.....	Clear and cloudy.
	8 p. m..	36	40. 3	W., moderate	Do.
26	8 a. m..	32	.....	.....do.....	Dark and snow.
	Noon ..	34	.....	W., SW., moderate	Do.
	8 p. m..	28	31. 3	NW., fresh	Clear and cloudy.
27	8 a. m..	25	.....	N., gale.....	Do.
	Noon ..	23	.....	N., very strong	Cloudy and at times snow.
	8 p. m..	21	23. 0	NW., fresh	Dark and at times snow.
28	8 a. m..	23	.....	.....	Clear and cloudy.
	Noon ..	35	.....	.....	Do.
	8 p. m..	27	28. 3	SE., fresh.....	Dark and snow.
29	8 a. m..	37	.....	SW., fresh.....	Clear and at times snow.
	Noon ..	42	.....	.....do.....	Clear, sunshine, without clouds.
	8 p. m..	35	38. 0	W., very fresh	Dark and snow.
30	8 a. m..	29	.....	N., fresh.....	Clear and cloudy.
*	Noon ..	36	.....	.....do.....	Do.
	8 p. m..	24	29. 6	SE., moderate.....	Do.

* Mean temperature for thirty days in March, 36. 81 degrees.

Summary.

Month.	Mean temperature.	Daily maximum.	Daily minimum.	No. cloudless days.
	°	°	°	
November 1866	36.1	41.7	30.3	2
December 1866	33.9	41.0	24.3	0
January 1867	31.7	37.0	24.3	0
February 1867	33.3	45.6	14.7	0
March 1867	36.8	44.3	23.0	4

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